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LIGHT ✦ HEAT ✦ POWER ✦ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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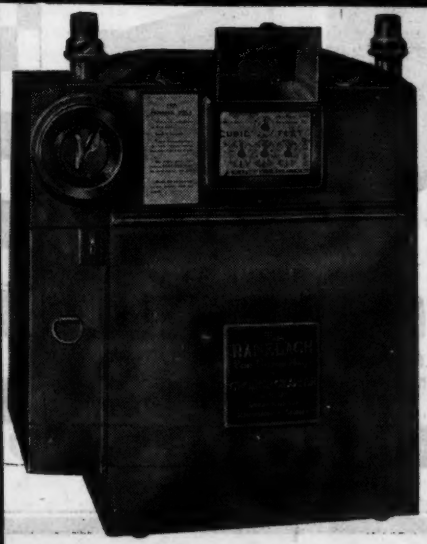

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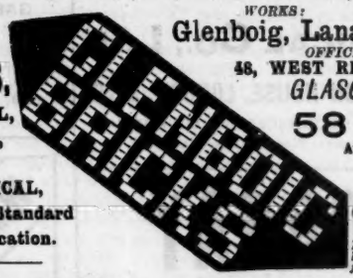

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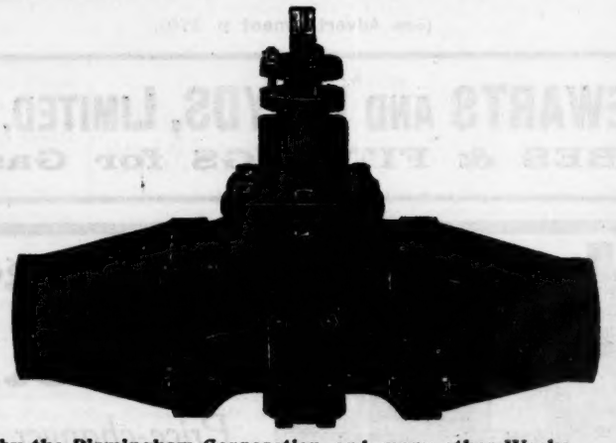

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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CLIII., No. 3012.] WEDNESDAY, FEBRUARY 2, 1921. [73RD YEAR.

EDITORIAL NOTES.

Advantages and Disadvantages [?] of the Gas Regulation Act.

IT will come as quite a shock to some people who have the deepest faith that the Gas Regulation Act will operate wholly and completely to the benefit of gas undertakings to find that such a critical observer of the affairs of the industry as Mr. F. W. Goodenough, the Executive Chairman of the British Commercial Gas Association, discovers that the advantages are mixed with disadvantages from the commercial point of view, and that this is found in the initial and fundamental section of the measure. This opinion is expressed in the article which Mr. Goodenough contributes to the special series (which is attracting such wide attention throughout the gas industry in this country and abroad) treating of the transfer of the British gas industry from the volumetric to the heat-unit basis—not only of charging, but of working. However, we are saved by our contributor from any great uneasiness regarding the soundness of our own views by the fact that he admits that the disadvantages that are obvious from the commercial point of view are fortunately of mainly a temporary character, while the advantages are permanent and important.

Our contributor treats first of the advantages; and the advantages as he states them appear of such monumental character that the temporary disadvantage is safely buried away beneath them. The outstanding advantage is the relief from financial hardships; and this is something that is appreciated by everyone concerned in the industry, and by no means least by those engaged in the commercial development of gas. Mr. Goodenough looks at the relief from the standpoint of the effect it will have in stimulating the staffs. In his opinion, there is nothing that is more destructive of initiative, zeal, and enterprise upon the part of an employee than to know as a certainty that anything he does or can contrive by ingenuity and skill cannot bring additional profit to the concern. The same applies to the employers. They grow lethargic in the matter of adopting progressive policy and methods if there is no possibility of reward to the proprietors. Fixed dividends and (in the case of municipalities) no dividends, he finds, is one cause of the uncommercial policy, the want of enterprise, and the indifference that has characterized the operations of some undertakings. We quite agree; but that is not the sole reason. However, this opens a subject into which we cannot go here. On the general question of financial rehabilitation from the commercial standpoint, there is the aspect of it upon which Mr. Goodenough does not touch, and it is that, without this step in restoration of the conditions of capital reward, lower-priced and abundant capital for the industry would have been a thing much desired at the commercial end, but practicably unobtainable. And so far as we can see, Mr. Goodenough and his colleagues in the commercial section will be wanting a large amount of money spent on heating appliances, more especially if all that is expected from the "advantages" conferred by the Act materializes at the producing end.

The second advantage that our contributor sees in the Act is the universal application of calorific value as the quality of gas, with the accompanying freedom in manufacturing the quality which each undertaking finds it profitable to supply. Mr. Goodenough does not put any narrow monetary interpretation on the word "profitable." He, and very rightly, expands it until it covers satisfaction to the consumer. This is highly important; and every gas maker operating at the producing end must ask himself in regard to any change he proposes: "How will this suit my colleague at the outlet of the "distribution system?" The gas maker is not likely to overlook this point after he has read what is said in this week's special article. In this connection, our contributor warns the other end, in order to protect that part of the gas system—the gas-trading part—upon which stability and development depend. He does so in a manner which will go home. The language employed is patently intended to reach and to impress. For example, it is an incisive thrust which we get in such a sentence as this: "The freedom to "supply any quality of gas will be a bad thing for the in-"dustry unless those responsible for its policy are their own "most severe critics." There is truth there. The ground on which our contributor bases opinion and judgment is not confined to the Gas Light and Coke Company's boundaries. As the Executive Chairman of the "B.C.G.A.," he gains knowledge of conditions very far afield; and he knows of the deplorably bad management in some areas that does not even pretend to give any uniformity of supply—uniformity in calorific value, specific gravity, and pressure. This has been the cause of prolific complaint; and it has occasioned very heavy damage to the gas industry.

It was owing to this uncommercial policy of some undertakings that it was imperative that pressure enactment should be brought into line with modern needs and practice. The application of this corrective to mismanagement is the third advantage which, from the commercial standpoint, our contributor sees in the Act. We are confident of this, that the consumer who can get cheaper therms supplied to him under proper conditions will be more satisfied than a consumer who has more costly therms supplied to him, also under proper conditions. The difference in price will tell; and the commercial man will realize this in his work. Whatever the calorific value per cubic foot, all-important are the conditions of supply, and their day-by-day level maintenance, so far as is practicable. If they are right, the work of gas vending is lightened, and the satisfaction of consumers is such a certainty that the officials who come into contact with them go about their work with a confidence which does not fail to energize.

Now we come to the one and only disadvantage—as Mr. Goodenough sees it. That is the change from volume to heat-unit charging. There is obviously great doubt on his part as to whether any commercial representative really welcomes the change, which he also fears only a small percentage of the consumers will ever properly understand. But have the general consumers ever properly understood cubic feet? They certainly have not understood what the cubic feet have represented. And as to the meter, Mr. Goodenough himself describes it as a "proverbial source of mys-"tification and incredulity." Whence then the disadvantage that is thought will arise from the change from something not understood to something which (at present) may well be placed in the same category? In regard to this change, our contributor says the commercial representative cannot truthfully give the customer any promise or hope of any benefit to himself that could not have been secured under the system of charging by the cubic foot. If the consumer is not an absolute numskull, he will soon learn that, in buying and paying for quality, he is buying and paying for something far more definite than he has ever done before. Nor has the consumer ever had such excellent protection as he will be obtaining under the Act.

There is a point that Mr. Goodenough in his consideration of this matter has apparently overlooked. In charging on the heat-unit basis, there is another commercial advantage which in our view is highly important, with each undertaking in a position to declare the calorific value most suitable to its economic and plant conditions. In one part of the article, our contributor speaks of the injury that

bad management in one district occasions to good management in another district. That also applies to this question of heat-unit charging. There is agreement on his part with the new policy that each undertaking shall declare its own calorific value. Now supposing one undertaking supplies a declared value of 400 B.Th.U. at a lower price per 1000 c.ft. than a neighbouring one which is supplying 550 B.Th.U. gas. The salesmen would have rather a bad time of it in the area in which the richer gas was supplied and the higher price per 1000 c.ft. charged. The public comparisons would to him be an embarrassing disadvantage. But in charging per 100,000 B.Th.U., the consumer has a definite basis of comparison which irons-out all the discrepancies that prevail under the system for which Mr. Goodenough has a lingering affection. We have to make the best of a "bad job," he gravely says, as he contemplates the departure of the "per 1000 c.ft." And he is sure that every gas undertaking will do its utmost to extract good out of evil. We do not at all care whether the change is described as a "bad job" or "evil" so long as the extraction process results in good. The more the commercial staffs attack the change in the spirit that our contributor has in him, the sooner will the industry be in smooth waters. We are glad to see the "B.C.G.A." are preparing literature which will be helpful to the commercial man in removing any difficulties that there may be, and which perhaps are inseparable from a change in trading methods of such a far-reaching order.

The so-called disadvantage of the Act appears to shrink perceptibly the more it is looked at with the several advantages of the Act also in view. We do not think the former will obscure the latter. It is more likely the reverse will be the order, if the one "disadvantage" has any substantial reality about it. But we finish up with Mr. Goodenough in the expression of the hope that the Act will be a stimulus to all undertakings to make their policy and methods worthy of a live and progressive industry.

The Coming Inquiries and a Consolidated Case.

IN the "JOURNAL" for Jan. 12, the names were published of the members of the two Committees who have been appointed by the Board of Trade, under the powers conferred by the Gas Regulation Act, to consider whether it is necessary or desirable to limit the proportion of carbon monoxide and incombustibles in gas supplied for general purposes. By the minutes of the Council of the Institution of Gas Engineers printed in our columns last week, it was seen that communications have passed between the National Gas Council and the Institution regarding the inquiries. We hope this means that a consolidated case is being prepared in the name of the entire gas industry in opposition to any restriction whatever. This will save time; and the views of the gas industry will then be presented in a manner which will show as nearly as possible a united front. After the vigorous protests against restriction that have been made at meetings of the National Gas Council and of the Institution of Gas Engineers, it would be impossible for anyone to affect to speak in the name of the industry without standing for an unqualified dissent to its liberties being interfered with — more especially so far as carbon monoxide is concerned, in view of the experiences over the past twenty years and more, and particularly during the war; and so far as inerts are concerned, in view of the heat-unit basis of charging acting as an incentive to the production and distribution of heat energy as the main object of every gas supplier, with as low a percentage of incombustibles as the economic and plant situation of an individual concern will allow. But merely an "unqualified" dissent" will not represent a sufficient case to set against that which we may be sure will be submitted by those who have been instrumental in forcing forward these questions to the point of departmental investigation. Very strong and sound arguments will have to be adduced against their plea for restriction; and this should be better possible by combined effort on the part of the organizations of the industry than by any other course. We may be quite sure that the Fuel Economy Committee of the British Association (who cannot be unanimous on this question of restriction, and those of the members who are favourable we imagine are simply led by their Chairman, Prof. Bone, whose personal strong views do not prove either necessity or desirability), the Railway Companies, and possibly the Association of Municipal Authorities not Owning Gas Undertakings, are busy preparing the case or cases that the gas industry will have to meet. The question will have to be examined from all points of view—scientific and economic; and experience cannot and must not be overlooked, if a proper decision is to be given upon the reference as to whether restrictions are "necessary or desirable." So we hope that the mention of the matter in the minutes of the Council of the Institution of Gas Engineers means that a consolidated case is being arranged from the side of the gas industry; and to secure this should be the object of every gas man who objects to these attacks upon the liberties of the gas industry, and to the obstruction by outsiders to the free development of the technical and commercial interests of the industry.

The Extraordinary Secondary Products Year of the Gas Light Company.

A REMARKABLE condition of things is revealed by the annual accounts of the Gas Light and Coke Company which the Governor (Mr. D. Milne Watson) will be submitting to the proprietors next Friday. Dominating all else and influencing the accounts and working in a manner for which there is no precedent, nor likely to be a repetition, are the receipts for secondary products, which have enabled the Board to keep the price of gas running so long at the 4s. 8d. figure, despite the high costs of coal, oil, and labour, and the meeting of the claims for maintenance and renewals, that got into a backward state during the war, and which have now to be attended to with plant, materials, wages, and transport all at high figures. When the full extent is known of the "landslide" in the secondary products position from the abnormal conditions of the year, people will not then marvel at the increase in the price of gas from 4s. 8d. to 5s. 6d., but consumers will rejoice that the big slice of secondary products luck came to stave-off so long the further rise in the price of gas. The consumers have got half way through the winter with the 4s. 8d. price. Lighter days and warmer weather are now before us, and "Summer Time" will soon be coming again. Consumption will therefore recede; and it is hoped that before next winter things will be more stable than they are at present.

These are subjects which, with the passing of the Gas Regulation Act, will make good material for a final speech from the chair on Friday on the work of the concern before it is transferred to the basis that will be provided by the Order that the Company have applied for under the Gas Regulation Act, and which should be almost immediately issued. Thus in a treble way the accounts for 1921 when published will be far different from those that are now before us. There will not then be the abnormal tale supplied by the secondary products; the accounts will be on the new basis of trading; and, for the long-suffering proprietors' sake, we hope that the first paragraph of the report will then bear a complexion different from that of the present one, which announces that all the dividend that can be paid—this due to the Statutory Undertakings (Temporary Increase of Charges) Act—is at the rate of 3 p.ct. per annum on the ordinary stock, and £2 12s. 6d. p.ct. on the 3½ p.ct. maximum stock. After the distribution of these low dividends, the carry-forward will be £326,597, or only £2626 more than the balance brought into the year. This is close working under extraordinary conditions; and the small difference in the carry-forward raises the question as to what it would have been had it not been for the enormous contribution to revenue of the secondary products.

Let us follow this up at once. The total receipts from secondary products amounted in the year to no less than £4,839,214, or an increase upon 1919 of £2,117,741, or 77·7 p.ct.! Of this increase coke (in realizing £3,662,610) contributed no less than £1,638,943, and breeze (bringing in £158,299) £61,451, although in selling 1,203,218 tons of coke this was only an increase of 134,123 tons, and in selling 272,044 tons of breeze an increase of 38,356 tons. It was the demand from the Continent, and through the coal strike—during all the time it was threatening, while it was on, and before coal was again plentiful—that chiefly account for this great fluctuation to the good in market values and the swelling of income. But tar and tar products supplied a revenue of £690,330, or more by £379,776 than in 1919; and ammoniacal liquor subscribed £327,974, or £37,570 more. The effect of the total increase (£2,117,741) in the income from secondary products is notable. The quantity

of coal carbonized was 2,279,253 tons, or an addition of 197,194 tons. There was a greater consumption of gas, and naturally the order of things was, with oil expensive and the secondary products so good as revenue producers, that coal gas should, as far as possible, have preference in manufacture. For the coal carbonized £5,318,863 was paid (this including all expenses); and the high prices ruling for coal are seen when the increased payment for it is found to have been £1,285,094, although only 197,194 tons extra were used. When the extraordinary receipts for secondary products are deducted, the net cost of the high-priced coal is brought down to £479,649; while in 1919, with the cost of coal £1,285,094 less than last year, or a total of £4,033,769, the net cost (deducting the revenue from secondary products) was £1,312,296. Abnormal bye-products markets make the year's accounts abnormal all through.

We see this again in the working. As has been noted, 2,279,253 tons of coal were carbonized during last year, or 197,194 tons more than in 1919. Also used were 6,251,005 gallons of oil, or 940,071 gallons less than in 1919. With secondary products so lucrative, and the price of oil what it was, it was better to limit as far as possible the making of even slightly carburetted water gas; and so of the total gas made in the year (35,148,709,000 c.ft.) only 7,350,793,000 c.ft. were water gas, or 20·9 p.ct. The coal gas produced was therefore 27,797,916,000 c.ft., or 2,395,632,000 c.ft. more than in 1919, which augmentation was required by 1,454,654,000 c.ft. more gas being sold, and 502,643,000 c.ft. less water gas being made. The average quantity of gas made per ton of coal was 12,196 c.ft.; and the oil used per 1000 c.ft. of water gas was 0·85 gallon, which is about the 1918 figure, and is rather less than that for 1919, when it was 0·91 gallon. It is observed that the quantity of coal in store at the end of December was 231,390 tons, which is better than the year before by 66,655 tons.

Regarding the position of the primary business, that is highly flourishing. The receipts for gas were £7,266,350, or an increase of £738,223, to which increase private consumers contributed £691,166, and public lighting £47,057. The increase of revenue from gas, however, is misleading as a guide to growth, seeing that it was largely the product of the 4s. 8d. price which ruled throughout the year, and only obtained during the final quarter of 1919. That the consumption increased by 4¾ p.ct. during the year, or 1,454,654,000 c.ft. (the total sales amounting to 31,963,543,000 c.ft.), speaks volumes as to the popularity of gas, even in times of high charges. This increase, again, does not tell the whole of the tale. The 4¾ p.ct. addition is *plus* the maintenance of the 15½ p.ct. increase experienced in 1919, which (due partly to the cancelling of the Fuel and Lighting Order) represented a jump in sales by the enormous volume of 4,090,143,000 c.ft. Furthermore, maintenance and increases of business are subject very much to atmospherical conditions, and the second half of last year only experienced two or three weeks of excessively cold weather. Another indication of growth is that during the year the number of consumers was enlarged by 9331; and there was an increase of 32,238 in the number of gas-stoves sold and let out on hire.

This is all very satisfactory. It only requires coal and oil to come down in price (a lower cost of coal would influence the prices of other things) to make a difference all through the accounts, and to bring about more settled conditions. Given these, the business would render results which would be more pleasing to both the consumers and stockholders. It may be thought that, with secondary products yielding so well, and the net cost of coal being what it was, the price of gas should have been lower. The carry-forward shows that something else prevented this. Looking down the items of expenditure in the revenue account, the prevailing conditions of high cost are represented by bulky figures all through. We will not refer to them all. But it may be pointed out that labour cost the Company last year £3,415,706, which was an increase on 1919 of £809,927 and on 1913 of £2,351,627. Salaries have also gone up—now amounting to £429,329, or £111,352 more than in 1919, and £238,673 more than in 1913. By these and other much swollen but uncontrollable items is seen how the temporary benefit of the prices to which all secondary products soared has been absorbed. But everything points to the expenditure apex having been reached. The height last year is marked by the total of £11,877,286, or £2,873,121 more than in 1919, which is about the sum of the increased receipts from the secondary products and gas sales. The total receipts for the year were £12,790,821; so that the balance to net revenue account is £913,535, or an increase of £63,671. The Company have never had accounts with such features as are contained in those for the past year.

Measurement of the Performance of Gas Appliances.

ON various occasions we have urged readers of papers, when dealing with gas-consuming appliances, to state as far as possible, and later on always, their consumption for any given work in terms of B.Th.U., and not cubic feet. On various occasions, too, we have submitted that henceforth gas undertakings should only buy gas-consuming appliances after testing the various types under equal conditions, and ascertain which of them will give the user the best thermal efficiency. In last week's "JOURNAL," Sir Dugald Clerk reminded readers that the heat unit has been much used by steam and internal combustion engineers for at least eighty years as a standard of measurement of the performances of their engines. For over a century, gas men have been talking among themselves and telling other people how many cubic feet of gas of x heating value are required for doing a certain amount of work, or how long a gas-fire will run on a pennyworth of gas, or how many pints of water can be boiled for a penny, or how many hours' light can be obtained for the same coin. The time has come for bidding farewell to such crudeness. Consumers have never known what was the qualitative value of the cubic foot, nor what it was the penny was buying. Nor could gas men tell, when they sat listening with all seriousness to statements as to work done by so many cubic feet, whether the efficiency was excellent or downright bad, or whether it occupied a place intermediate of the two extremes.

The Gas Regulation Act is going to transfer our affections and trading from cubic feet to heat units, and make us more precise in the rendering of the efficiencies of gas appliances, in which direction the reports of the Gas Investigation Committee of the Institution of Gas Engineers and the Leeds University have set us a fine example. And it is about time that this came about. When selling B.Th.U., and calorimetric tests are universal, we shall be able to ascertain accurately the quantity of heat units absorbed by different designs and makes of appliances in accomplishing a certain amount of work, or in rendering certain effects. The heat unit will become the standard of measurement of the performance of all gas-consuming appliances. We shall soon be speaking of the 30, 40, or more candle-hours given by low-pressure burners per 1000 B.Th.U., or the (say) 100 to 120 candle-hours per 1000 B.Th.U. of high-pressure burners. And we shall be dividing by 100 the price per therm, in order to see what is the cost of the 1000 heat units which give this quantity of light, under the stated conditions of supply.

Perhaps before long standard tests will be evolved for different appliances; and this is especially desirable at the present time in connection with gas-ovens, in regard to which the only really comparative test at present is to ascertain the B.Th.U. required to raise the oven to a certain temperature from the prevailing atmospheric temperature, and the B.Th.U. required to maintain the temperature over a given time. It is easy enough to determine the relative efficiencies of boiling-rings, to ascertain whether 800 or 900 B.Th.U. or any other quantity are required for raising from the ascertained temperature of the cold water to the boiling-point (say) a quart or 2½ lbs. of water. The measurement of the efficiency of other means of water heating, too, can be fairly easily made. Another desideratum is a simple equipment for measuring the radiant efficiency of gas-fires, which could be adopted by all gas undertakings. Measurement of the flue heat can, of course, be made, and other rough tests instituted on the basis of the B.Th.U. supplied to the fire. Scientific accuracy, however, necessitates scientific means and positive conditions. The measurement of the thermal performances of furnaces and crucibles is a matter upon which the experts should determine standard conditions. In relation to power, too, gas salesmen will in future have to be telling the manufacturers buying heat units in the form of gas something as to the number of units required—8500, 9000, or whatever the figure may be—per B.H.P.-hour.

As we think over these matters, it is clear the gas industry has been living in a very elementary state in regard to them. But this is no doubt traceable to gas undertakings having for so long been statutorily bound by candle power, and the sale by volume of gas of a standard candle power.

These days are past; and all gas undertakings will now be able to live and operate under conditions which will enable them to ascertain with greater readiness the relative efficiency of different makes of appliances, and so be able to recommend the best to their patrons with the greatest assurance. In the purchase by gas undertakings of gas appliances for domestic and industrial use, personal influences and old-time business connections must no longer be factors; efficiency and prices will be the factors that must dominate future business. Standardization of appliances must also be governed by efficiency; for the industry is moving on to the heat-unit basis, which means a transfer from crudeness to something definite and far-reaching.

Furnace Efficiency and Costs per Therm Usefully Employed.

THIS is a subject of which Mr. W. Newton Booth has, through his position at the Woolwich Arsenal, made an extensive study; and his work has been fruitful of improving result. As was seen by the paper [published last week] that he read before the London and Southern Junior Gas Association, his investigations have proceeded in thorough scientific fashion; and it is research of this kind that is so very desirable to-day. Gas-furnaces have made good progress in thermal efficiency, though in some types there is unfortunately a much larger scope than a 50 p.ct. loss on which to work to secure further efficiency improvement. It is, however, something to the good that Mr. Booth is able to point to a thermal efficiency of over 50 p.ct. for large furnaces, where the walls are specially constructed to resist the passage of heat, and where the heat of both the flue gases and of the work leaving the furnaces is used to the full for preheating the air and gas. Throughout the paper Mr. Booth uses calculated efficiencies; but in Table V., in which are shown the relative costs of fuel, "assumed" efficiencies are employed. The figures in the table must therefore only be applied with discretion. For instance, with coal gas an efficiency of 25 p.ct. is assumed, and not the best efficiency of 50 p.ct. Of course, there is justification for not taking the top figure; but a mean between 25 and 50 p.ct. would perhaps have been more representative of good-type furnaces and modern practice. The result of the assumed 25 p.ct. is that with gas at 10·75d. per therm, the cost per therm usefully employed works out to 43d. With 50 p.ct. efficiency, the cost per therm usefully employed would come down to 21·5d.—one-half. Blue water gas stands well in the list of fuels, even with the assumed efficiency of 25 p.ct. Taking the cost at 6d. per therm, the cost per therm usefully employed is 24d. There is only one item lower, and that is the self-contained producer, which with the same assumed efficiency gives a figure of 22·4d. per therm usefully employed, which is close to blue water gas. Fuel and labour alone of the producer gas costs (according to the table) 5·6d. per therm, without including capital charges; while the South Metropolitan Gas Company are supplying their domestic consumers at 10·5d. per therm. Producer gas, too, has its limitations. It would only be economical for large installations; and it cannot compete with ordinary town gas for cleanliness, regularity, small space occupied, and high all-round efficiency. We see that for electricity, Mr. Booth only charges 1d. per unit; and so by electricity a therm is supplied for 29·2d. The assumed efficiency of the electric furnace is placed at 60 per cent.; and therefore the cost per therm usefully employed works out to 48·6d., or twice as much as blue water gas, but only 5·6d. behind coal gas on the terms adopted in the table. The 1d. per unit is too low a charge; and practical experience gives a difference in actual costs as between town gas and electricity of a more material order than Mr. Booth shows, otherwise the electric-furnace would have greater popularity than the gas-furnace. The fact is the electric-furnace is confined largely to high-temperature work, and this purely on account of cost. However, this is not the chief point in Mr. Booth's paper. Its main features are an examination into the causes of heat losses, and into the design and materials which contribute to higher efficiencies. There is much here for consideration by those interested in the subject. If the furnace experts have anything to say in the way of criticism of the contents of the paper, our columns are freely open to them, and no doubt Mr. Booth will be prepared to discuss with them any points they may think fit to raise.

Drop in the Miners' Pay.

Coal output in the test period allowed the payment last month to the miners of 3s. 6d. per shift extra; but now comes a fall. Making an adjustment under the terms of the settlement for the Christmas and New Year holidays, the output during the period on which the February payment is to be made was substantially below the rate during the preceding test period. Hence for February the workers of 18 years and over will take an additional 1s. 6d. per shift instead of 3s. 6d., 9d. for workers of 16 and 17 years, and 6¾d. for workers under 16 years. There was an improvement in the output of coal for the week ended Jan. 13. It was 4,897,700 tons; but this is below the good returns for the early weeks in December.

Proposed New Basis for Paying the Miners.

The discussions between the mine owners and the Miners' Federation have resulted in a provisional basis for wage payment. It is on the co-partnership principle. Long ago Dr. Carpenter suggested that a co-partner scheme could be applied to the coal industry, if those concerned would only set their wits to work to devise a scheme. But the pessimists said it was impossible. Now the owners and miners have themselves drafted a plan which negatives the views of these people. The proposal is that the first charge upon the income of the industry shall be a fixed minimum wage at the rate of 50 p.ct. of the present wage, including all war and Sankey wage advances, and that this minimum wage shall carry with it a minimum income return to the mine owners of 2s. per ton. The remaining income of the industry would be divided in the proportion of two-thirds in wages to the whole of the workers employed on a percentage basis of their minimum wage, and the other one-third to the colliery owners in the form of additional profits. This is only a rough outline. There are a lot of details to which form has yet to be given. But anyway the scheme is sufficiently advanced for the Miners' Federation to consider that the time has come to take the opinion of the district organizations upon the scheme. On the subject of decontrol, the Miners' Federation intimate to the Mines Department of the Board of Trade that they cannot acquiesce in decontrol till the mine owners and themselves are able to present to the Government a generally agreed plan for national control which will effectively substitute the present arrangements. The position of things in the coal-mining industry to-day is not such as to warrant even the Miners' Federation taking up a dictatorial attitude on a question of policy.

Reinforced Concrete Gas-Pipes.

Are these likely to become popular in this country for the conveyance of gas? It is difficult to say till there has been more experience. From the admirable paper by Mr. L. H. Thomas, of Birmingham, which was published in the "JOURNAL" last week, it appears to be his deliberate opinion that they are likely to come into good use. Experience is being gained by the Barnsley Smokeless Fuel Company with mains of 14 and 24 in. diameter; but the type of pipe which appeals most to Mr. Thomas is that known as the Hume, for which the Stanton Coal and Iron Company have secured the rights. The fact that a Company so largely concerned in the manufacture of iron pipes should have acquired the rights in a process for making reinforced concrete pipes is a matter of significance. Higher pressures are going to be, and compulsorily so, the practice in the gas industry; and pipes which it is said can be made to withstand 400 lbs. per square inch without percolation are productions which will command respectful consideration by gas men, who, with all the distribution work which will soon have to be taken in hand, will be glad to welcome something that will produce economy and assist in reducing maintenance costs, providing the item of unaccounted-for gas is not enlarged. Anyway, with such pipes the bugbear of corrosion would disappear. Experience from an introduction of reinforced concrete pipes in the gas industry would be heartily welcomed.

Prices of Raw Materials.

An interesting financial review for 1920, prepared by Mr. J. S. M. Ward, B.A., F.S.S., and Mr. N. E. Crump, F.S.S., has been issued by the Federation of British Industries. Among other things it shows the fluctuations in the rates of foreign exchanges and the prices of raw materials of industry. The gas

industry is particularly interested in these matters at the present time when so much new, renewal, and repair work is in hand, and is wanted. It is seen from the tabulated information, that iron (Middlesbrough warrants) fetched 50s. per ton in 1913. In 1919, the average price was 138s. In January of last year, the average figure was 172s.; in December, 225s. Steel rails were £6 10s. per ton in 1913; and £14 10s. in 1919. In January last year, the average price was £18; and in December, £24 10s. Copper, which was £65 per ton in 1913, was £91 in 1919. In January of last year, it was £117; but by December it was down to £75 5s. Tin is very interesting. It was £171 10s. in 1913; and £257 10s. in 1919. It was up to £371 in January last year, but down to £209 5s. in December. Since the review was issued, information has been published regarding the ancient method of bidding by smelters for black tin by tickets, which method came to an end on Monday last week. On that day, the average price realized was by this method £89 11s. 4d. per ton; whereas, at the corresponding ticketing last year, it was £204 6s. 10d. This drop explains why several mines are closing-down. Then lead (soft foreign), which stood at an average of £18 10s. in 1913, and £28 10s. in 1919, was £47 in January last year; but it was down to £24 10s. in December last. Coal (described as best Newcastle), which was 15s. 6d. in 1913, and 45s. 6d. in 1919, is put at 48s. 6d. for January last year, and 52s. 8d. for December last. But is the "best Newcastle" of 1913 the "best Newcastle" of December last? Anyway, the December price shows an increase upon 1913 of 240 p.ct. But it is noteworthy that the prices of metals are showing a decided downward tendency.

PERSONAL.

We find with regret that we are to lose another old Fleet Street colleague, Mr. JOHN DOUGLAS having left Messrs. Benn Bros., Ltd., and, of course, the "Gas World." He is the last to leave among those who were connected with the paper at the time of its foundation, having been Manager of the "Gas World" (published at the outset as "Gas and Water") when it was started in 1884. Some four years later, he left to fill another similar post, but returned in 1894, when he acquired a proprietorial interest in the paper. In 1917 the firm amalgamated with Messrs. Benn Bros., Ltd., of which he has since been a Managing Director. Mr. Douglas has been responsible for the production of the "Gas World Year-Book" since it was first published 24 years ago, and has been in newspaper life for fully 47 years. Our best wishes go with him in his retirement, which it is gratifying to learn has not been caused by a breakdown in health.

The Treasury have appointed Sir ROBERT ROBERTSON, K.B.E., F.R.S., D.Sc., Director of Explosives Branch, Research Department, Woolwich, to be Government Chemist, in succession to Sir J. J. DOBBIE, who has retired.

OBITUARY.

Many associated with the gas industry whose professional or commercial work had brought them into touch with the Nottingham Corporation gas undertaking will learn with regret of the death of Mr. FRANK B. HARRIS, who, as one of the legal staff of the Municipality, has had for many years a great deal to do with the city's chief department of public enterprise. He had been associated with Nottingham during a period of its greatest expansion, acting for a considerable period of late years as Clerk to the Gas Committee. While his professional work at all points was necessarily of a highly responsible character, it was in the domain of Private Bill Procedure that the value of deceased's knowledge had been particularly exemplified. In failing health, Mr. Harris, who was 69 years of age, had been, for a considerable period preceding his death, precluded from any participation in professional work.

A special joint meeting of the Society of Chemical Industry and of the Institution of Mechanical Engineers will be held at the rooms of the Institution, Storey's Gate, Westminster, S.W., on Friday, March 4, at 6 p.m., when Monsieur Paul Kestner, the President of the Société de Chimie Industrielle, will read a paper on "The De-Gassing and Purification of Boiler-Feed Water."

The 51st annual meeting of the Manchester Institution of Gas Engineers will be held in the Council Chamber, Town Hall, Leeds, on Friday, the 25th inst., at 2 p.m. After the presentation of the annual report and statement of accounts, the President-elect (Mr. Samuel Tagg, of Preston) will deliver his address; and at the close of the meeting an adjournment will be made to the Artillery Drill Hall, Fenton Street, where an inspection of the Gas Exhibition, promoted by the Leeds Corporation Gas Committee, will be made by the members.

ELECTRICITY SUPPLY MEMORANDA.

EVIDENCE continues to accumulate that the adoption of electricity for lighting in the housing schemes is an extravagance when gas is also laid on to the houses for cooking and heating. Last week attention was called to this matter in the "Memoranda;" and instances were quoted where reason is in the ascendant, and the whole business of lighting, cooking, and heating is going to gas on the score of proved economy. Now we see in the London County Council proceedings that the Housing Committee have been investigating the cost of electric lighting and gas cooking and heating for the estate at Bellingham. The whole of the work goes to the South Suburban Gas Company; and the Ministry of Health have now given their approval. The Company have undertaken to provide (on the prepayment meter system) a supply of gas and all necessary fixtures and fittings, including cooking-stoves, and to maintain them free of cost to the Council. If electricity were used for lighting purposes, gas would be required for cooking and heating; and in this event the Gas Company would make a charge of £5 a house for laying the necessary services to the meters. A supply of electricity could only be obtained on terms which would involve expenditure estimated at over £19 a house. The County Council have therefore no alternative but to use gas throughout. The mains, service-pipes, and general piping will be carried out during the erection of the houses; and each room will be provided with a pendant or bracket fitted with an incandescent burner, mantle, and plain glass globe—the gas to be supplied through slot meters at the current rate, *plus* the ordinary charges for hire under the prepayment system. Renewal of mantles and globes will be the responsibility of the tenant. Here we have yet another win for gas on costs. The tenants will be in pocket, and so will be the electricity suppliers, who think as much of their dignity as of their profits, and have not room to consider the losses they would incur through heavy capital expenditure on, and small revenue from, the lighting of artizan dwellings.

Another Win for Gas.

Some local authorities are getting into an unseemly mess with the finances of their electricity undertakings; and they are disposed to continue to allow their obligations to swell at an alarming rate, with the ratio of cost to producing or transmitting capacity having no resemblance to the pre-war condition. There appears to be a very fine irresponsibility abroad just now among some of the municipal owners of electricity plants; and the future we venture to think will prove that many things that are being done at the present time are not of a nature that will subscribe to the well-being of a concern later on. We learn that the Woolwich Borough Council have made an application to the Electricity Commissioners for a loan of £230,000 for electricity extensions; and the Commissioners are apparently willing to sanction a loan of £60,000—£40,000 for plant, repayable in twenty years, and £20,000 for a main transmission line for a bulk supply to Erith, repayable in forty years. But as the line is not expected to be loaded for some years, the Commissioners think they would be justified in sanctioning the postponement of the commencement of repayment for three years. The Woolwich electricity concern is one of those unfortunates that involve a charge on the rates; and the Borough Council have an arrangement with the London County Council for an acceleration of the repayment of debt outstanding for superseded plant. The County Council have drawn the attention of the Electricity Commissioners to the serious financial position of the electricity undertaking; and they express the hope that the Commissioners will satisfy themselves that the new expenditure would result in an early improvement in the present unsatisfactory financial position of the concern. How the Commissioners are to satisfy themselves in that regard is rather a puzzling matter. We suppose that in times past the County Council "satisfied" themselves that the loans they granted to Woolwich would result in an early improvement in the fortunes of the undertaking; but the fact is that it is to-day in an impecunious state, is a charge on the rates, and plant that has been superseded has not been paid for. This is an unhealthy position in which to be asking for heavy loans. But Woolwich is not an isolated case; it is merely an example.

Piling-up Trouble.

If manufacturers are so very anxious for a greater supply of electrical energy in these days, then why do they not come forward and help to finance electricity stations run by municipal councils who, in the present exigent financial conditions, cannot raise loans for the purpose. A fortnight ago we referred to the loan-raising difficulties of the chief of Midland cities. It is the opinion of Mr. George Cadbury, jun., that it is of vital importance to the prosperity of Birmingham that the Nechells electric power station should be developed. He thinks it feasible that a special 6 p.ct. electric supply loan should be inaugurated, and an appeal be made to the manufacturers to subscribe, "because a manufacturer proposing to develop his business would have to face the problem of either getting additional current from the Corporation, or putting-down his own plant." We are not persuaded that in these times manufacturers would look upon this as a particularly good investment.

Manufacturers' Loans for Power Supply.

Not all manufacturers desire to extend their power-driven plants; and those who do not wish to do so would not be greatly attracted by a 6 p.ct. loan. Moreover, those who did subscribe would probably expect preferential treatment in meeting their power requirements, and that might be illegal. Again, in these days manufacturers require money for their own businesses; and they are themselves paying more than 6 p.ct. for capital. We think they will look twice at Mr. Cadbury's suggestion, and then turn away. But he seems to think the scheme a good one. Maybe he knows the Birmingham manufacturers better than we do, in respect of what they are prepared to do to help the electricity undertaking. But the extent of his confidence in municipal administration is shown by his view that the manufacturers who may invest in the scheme should have safeguards, by the Corporation obtaining powers to enable them to co-opt one representative to be nominated by the Chamber of Commerce, and one to be nominated by the Electrical Trades Union. In his opinion, the advice of these two persons would prove extremely valuable to the Electricity Committee. Perhaps the Committee would think otherwise.

Inferior Metallic Filament Lamps.

Another protest has appeared in the "Electrical Review" regarding the great inferiority of metallic filament lamps now being supplied to the market. This time it is Mr. Norman Ash, of Bournemouth, who complains. He makes a comprehensive allegation. "All the various makes," he says, "seem to be far below their pre-war or wartime quality both as regards life and candle power." His experience during the last few months is that fully 20 p.ct. of the vacuum type of lamp fail prematurely, and quite 40 p.ct. of the gasfilled type break down almost immediately. This is an unfortunate condition of things; and we know that the experience at Bournemouth is confirmed at other places. In Mr. Ash's opinion, the bad quality of electric lamps is doing the electrical world much harm, owing to annoyance caused to consumers, and consequent loss of faith in electricity as an illuminant. The protest concludes with a very nasty knock. "If," writes Mr. Ash, "the lampmakers were to devote more money and attention to perfecting their products, instead of to big advertising schemes, prices would fall, as the cost of replacing the present number of defective lamps must be enormous." If prices fell, and more perfect products were given to the users, the makers' revenue might diminish, seeing that they would get less per lamp and fewer lamps would be needed owing to longer life and better performance.

Hiring-Out Electrical Appliances.

The hiring rates at Maidstone, including charges for water-heating, was the subject of comment in the "Memoranda" for Dec. 22. From an article in "Electrical Industries," it appears that the scheme was introduced in July last. By the end of the year, there were about 100 flat-irons on hire, and about 75 fires, which is regarded by our contemporary as not a bad result in a short space of time for a town of under 20,000 inhabitants. Cooking, it is stated, has not developed quite so successfully; the number of stoves fixed being nine. On Dec. 22, it will be remembered, we particularly commented on the hot-water tank proposition. It seems that the sum-total of hot-water tanks on hire is three. A number of "boiling-rings" and other small appliances have also been installed. Our friends of the Maidstone Gas Company will be much interested to learn that Mr. Hoadley is merely waiting until he can get his mains strengthened before he goes "all out" in the cooking business. We take it his success will be about the same as that of other towns in which a big splash has been made, and then little more is heard of the matter. However, it seems that the electrical view is that what has been done is simply a foretaste of what will be. Mr. Hoadley appears to be perfectly satisfied with what has been done so far. His programme is carefully to choose the apparatus that he lets out on hire, so that the upkeep is low. When the time is ripe, there is to be energetic canvassing, because Mr. Hoadley says that his experience is there is a distinct demand for electrical apparatus on hire. He may be sure that a very watchful eye will be kept on his movements and strategy from the gas offices, and that his increased efforts will not be met by any diminution of effort to enlarge the gas business and make it still more stable. Our contemporary also refers to the "stream" of inquiries for electrical apparatus that resulted at Ipswich from persistent advertising. The "Electrical Times" alludes in glowing terms to what is being done by the Newcastle-upon-Tyne Electric Supply Company, the demand upon whom for electricity for general domestic and business purposes is increasing at the present time. But our contemporary speaks very generally on the subject. Actual figures are not quoted. They are evidently too precious to allow publicity for general edification. The extent of growing popularity, it is stated, can be gauged by the fact that the sale of fittings and apparatus for lighting, heating, and so forth has increased by 600 p.ct. since 1914. That is wrong. The "extent" of growing popularity cannot be "gauged" without we have at least a basic figure to which to apply the 600 p.ct. Electric irons and vacuum cleaners appear to be the most popular articles; but it is rather an expensive process for consumers to connect electric-irons to lampholders, and so have the current used charged-up at lighting rates. Actual figures are again hidden behind the vague statement that during the year "a record number" of electric cooking stoves have been installed in private houses. It is asserted, after the manner of testimony that truly applies to gas, that the "growing popularity of this method of cooking is due to the cleanliness, convenience, and ease of control, and its relative economy over other forms of cooking being greater than even in the case of lighting." What really comprises "cooking?" And is cooking current charged up at 2½d. per unit? We have very good ground for believing that the "economy" resides more in imagination than in fact; and so have those domestic experimenters who have reverted from electrical operation to reliable and (for over-all cooking purposes) much cheaper gas.

Electrical Development Association.

January is the beginning of the new financial year of the Electrical Development Association; and the dutiful electrical journals have been trying to whip-up new subscribers. Sometimes it is the local authorities to whom the prayer for additional support is made; and the manufacturers and contractors are also occasionally urged to consider their obligation to the publicity and developing machine. The plea for greater support is made on this occasion to all who are the beneficiaries of the work of the organization, so as to strengthen it, and invest it with larger scope for activities, some of which have to remain dormant owing to the want of heavier funds. It is observed that the members now number 400.

SULPHURIC ACID MANUFACTURE.

THE manufacture of sulphuric acid in the United States is dealt with, by Messrs. A. E. Wells aud D. E. Fogg, in Bulletin No. 184 of the Bureau of Mines, so fully as to extend to over two hundred pages of letterpress and illustrations, besides which there are a number of plates. The bulletin was prepared with the object of making known the main facts in regard to the industry in America, including a discussion as to the supplies of sulphur-bearing raw materials, the situation of the acid plants, the principal points in connection with manufacturing processes, and the uses of the acid. Though a great deal of the data given in the bulletin may be found in various publications, this is the first occasion on which it has been assembled and made readily available. Notwithstanding the extraordinary consumption due to the demands of the Civil War, the production of sulphuric acid in America in the year 1865 was only 40,000 tons; but from that time onward the growth was steady, until in 1890 the total production reached 765,000 tons. Then in the period between the latter date and 1905, many new plants were put into operation, and thus the production was raised to considerably over 2,000,000 tons per annum. Coming to the year before the war [1913], the production was 3,575,000 tons; the growth that year being largely due to the expansion of the fertilizer business. War conditions more than doubled the production within a period of five years; the output for 1918 being 7,450,000 tons, on the basis of 50° B. At the time of the armistice, a number of new plants were in various stages of construction; but work on them was immediately discontinued, and within a very short period many Government and other plants already at work stopped. If the Government plants be eliminated, and also those built by explosives companies between 1915 and 1918, which will not continue to be operated, the situation as regards potential capacity on Jan. 1, 1919, reached 388,400 tons per month on the basis of 100 p.ct. H_2SO_4.

As to the raw materials used in the manufacture of sulphuric acid, mention is made of the amount of spent oxide available from gas-works, as being very small indeed, compared with the other sources. Though spent oxide runs as high as 60 p.ct. sulphur, and will average 40 to 50 p.ct., the presence of lime renders part of the sulphur unavailable for acid making. The material is, say the authors, contaminated with ammonium salts and ferro and sulpho cyanides, which would interfere with sulphuric acid manufacture—thus causing an unduly high consumption of nitre. These salts are usually washed-out before the spent oxide is used. Several schemes have been devised and plants erected for leaching the sulphur from the spent oxide by a hydrocarbon—such as benzole—or by carbon bisulphide, and then boiling-off the volatile solvent, leaving behind the sulphur, with any tars which might be dissolved. The product obtained has been 90 to 92 p.ct. sulphur; the rest being tarry material. This product would not be at all a desirable material in normal times for the manufacture of acid; but a small tonnage was produced and sold to acid manufacturers during the war.

A visit has been arranged for next Saturday of members of the Manchester and District Junior Gas Association to the Leigh (Lancs.) Gas-Works. After the inspection, Mr. H. J. Hailstone, of Rochdale, will read the "Notes on the Organization and Equipment of Bye-Product Works," which were reproduced on p. 231 of last week's "JOURNAL."

Technical Paper No. 267 of the United States Bureau of Mines, "Stenches for Detecting Leakage of Blue-Water Gas and Natural Gas," gives the properties of various stenches examined, their market prices, and methods for introducing them into gas-mains. It is felt that the addition of a stench to these gases would be likely to result in a material reduction of loss by leakage, thus increasing safety and promoting economy.

THE GAS INDUSTRY ON THE HEAT-UNIT BASIS.

Special Articles.—V.

THE contribution this week to the series of special articles is by Mr. F. W. Goodenough, the Executive Chairman of the British Commercial Gas Association. No man has taken a more prominent place in the gas industry in the advocacy of an energetic and complete policy in developing the sales of gas, and of living up to a high standard on the part of the managements of gas undertakings in the conditions of supply and service to the consumers. All his work in these directions is stamped with thoroughness. He now examines the Gas Regulation Act to ascertain what it contains for the commercial gas man. He finds advantages and one disadvantage, which latter happily he thinks may be only temporary, while the advantages will be great and permanent. We discuss the supposed temporary disadvantage and other points in the editorial columns.

THE GAS REGULATION ACT FROM THE COMMERCIAL POINT OF VIEW.

By F. W. GOODENOUGH, the Executive Chairman of the British Commercial Gas Association.

FROM the point of view of those responsible for satisfying the consumer and persuading him to maintain and increase his consumption of gas, the Gas Regulation Act (1920) has both advantages and disadvantages. The latter, if perhaps more immediately obvious from the point of view we are considering, are fortunately of mainly a temporary character; while the advantages will be permanent and important.

FINANCIAL ADVANTAGES OF THE ACT.

The Act affords the means whereby gas undertakings can obtain relief from the serious financial hardships—the grave injustice—from which they have been suffering all too long. That is its outstanding advantage from the point of view of everyone engaged in the industry; and by no means the least from that of those entrusted with its commercial development. For there is nothing more destructive of initiative, zeal, and enterprise on the part of an employee than to know as a certainty that nothing he does or can contrive to do by his utmost ingenuity and skill can bring any additional profit to the concern of which he is a part. It is ignorance or neglect of this fact which vitiates all the plans and brings to naught all the dreams of socialists and other similarly well-meaning but misguided social reformers. They plan as if the world were populated by altruistic angels; and the very human people for whom they build Utopias quickly prove that without the prospect of reward effort will always remain on a level far below the possible. It is only under the stimulus of such an emergency as war that men will exert their fullest energies for the community without hope of any personal advantage.

What applies to the employee applies also to the employer. What Board will go out of its way to inaugurate new methods or to adopt a progressive policy, if there is no possibility of advantage to the shareholders? I regard fixed dividends, and, in the case of municipalities no dividends, as responsible for much of the uncommercial policy and want of enterprise which have characterized all too many gas undertakings in the past, and can still be discovered without the aid of a magnifying glass. That by the aid of the new Act we are getting back to the position in which progressive policy and wise administration can bring financial reward, is its first and notable advantage.

PROFITABLE QUALITY AND CONSUMERS' SATISFACTION.

The second advantage gained by the industry from its new charter is the general adoption of the calorific standard, accompanied by freedom to manufacture and supply such quality of gas as each undertaking finds it profitable to supply. In the term profitable I include, of course, the satisfaction of the consumer, as all truly and permanently profitable business is based on such satisfaction. But a word of warning may not be out of place here—to the effect that mere absence of complaint is not necessarily conclusive proof of complete satisfaction. Many gas consumers have never experienced all the satisfaction that is to be obtained from good gas burnt at sufficient pressure in good appliances properly installed and maintained. They think the result they get from an indifferent supply of gas burnt in second-rate or out-of-date appliances poorly installed and worse maintained is the best that gas can do. They do not complain; for they know of no grounds of complaint. They are "satisfied," because they do not expect anything better. But they use no more gas than they can help; and their installations are no advertisement for gas. It is for gas managers to satisfy themselves that the gas they are supplying, the pressure they are giving, the appliances their consumers are using, are such as can and do give their consumers the best value for money—not the worst they will stand without grumbling.

Freedom to supply any quality gas will be a bad thing for the industry unless those responsible for its policy are themselves their own most severe critics. Low calorific value gas may yet be proved more economical to manufacture and supply as a general practice than high calorific value gas, after all factors—effect on manufacturing, storing, measuring, works-to-meter and meter-to-burner distributing capacities in particular—have been taken into account; and it may be proved to give the fullest possible satisfaction to the consumer. But let every manager be quite sure it is proved in his case beyond any doubt before he advises his Board or Committee how to make use of the freedom given them by the Act to supply any low-quality gas they choose to declare. If, as we all hope, freedom from statutory fixture of quality leads to cheaper gas (cheaper therms) with equal satisfaction to the user, every commercial representative in the industry will rejoice exceedingly. All that I wish to emphasize is the need for ensuring satisfaction as judged by the highest standards.

THE HIGHER STANDARD OF PRESSURE.

This leads to mention of the third advantage of the Act, from the "satisfy the consumer" standpoint—namely, the increase in the penal minimum limit in regard to pressure. That the figure (20-10ths) has been fixed full high, as a penal limit at any time at any place where there is a 2-in. pipe, I agree; and I regard as quite unfounded the fear of the railway companies that it does not give them adequate protection in all probable circumstances. But that it was imperative, owing to the uncommercial policy of a few undertakings, that legislation in regard to pressure should be brought into line with modern needs and modern practice, cannot be denied; for every gas undertaking in the country is interested in, because affected by, the policy and practice of other undertakings. If a consumer coming into district A from district B has had good service in the full sense of the words from undertaking B, the salesman's work in A is more than half done for him. The consumer *wants* gas for lighting, cooking, heating, and hot water; and of his own accord seeks the service of undertaking A. But if his experience in B has been of indifferent gas, pressure, and treatment, the salesman in A will have all his work cut out to persuade the incomer that gas possesses the advantages he rightly claims for it. For this reason, if for no other, it is imperative that progressive ideas and practice should be made widely known throughout the industry, and not kept locked up in the bosoms of those who have proved their value. And for this reason, too, the pressure clauses in the new Act are welcomed by those who know that, without ample pressure up to the point of consumption, the consumer cannot be satisfied as he ought to be, nor the undertaking flourish as it might.

Before leaving this subject of satisfying the consumer in regard to the value and pressure of the gas supplied, may I quote, to emphasize and endorse most heartily, the concluding paragraph of the interesting and able contribution from Mr. James W. Wood in the "JOURNAL" for Jan. 12:

> **The great aim for any one district should be uniformity—not merely uniformity of calorific value, but as far as possible reaching the calorific value by a uniform method of working. Constancy of pressure and of specific gravity of the gas are also important factors. Given this degree of constancy, appliances can be adjusted to produce results satisfactory to their users, certainly better than by spasmodic reversions to gas of higher calorific value when complaints arise. In many cases such complaints are due to insufficiency of gas quantity rather than defects in gas quality.**

This is a statement of facts and policy which I should like to see framed and hung up in every gas-works in the country, and wherever it could be read by those responsible for determining the size of mains, of service pipes, and, not least, of internal piping.

DOUBTS AS TO THE VALUE OF THE HEAT-UNIT BASIS OF CHARGE.

And now we come to the portion of the Act which has created the most excitement, and appears to be regarded by some as its principal virtue—the sections which provide for charging for gas per therm instead of per 1000 c.ft. Here is where the disadvantages hit one in the eye. Does any commercial representative of a gas undertaking really welcome a change in the method of charge which only a small percentage of its customers will ever properly understand, which interposes the necessity of a calculation (or a reference to a scale) between the reading of the measuring instrument (which itself is a proverbial source of mystification and incredulity) and the charge on the account, and in respect of

which he cannot truthfully give the customer any promise or hope of any benefit to himself that could not have been secured under the system of charge per 1000 c.ft.? If so, I should be interested to meet him.

That this change, in addition to confusing the consumer, and deepening his distrust of his gas bill, will confuse statistics, complicate all accounts and records, and increase work for some years to come, is obvious. But there the sections are in the Act. We have to make the best of a bad job; and I am sure that all the commercial representatives in every gas undertaking will do their utmost to extract good out of evil. They will have to familiarize themselves most thoroughly with the new method of charge, and prepare themselves to combat successfully not only doubts about the new system but doubts about the reliability of the gas-meter. If, when the method of charging is queried and the accounts are challenged, they will go right to the basis of all gas accounts, and satisfy the consumer that the ever-suspected meter is a most reliable instrument, speaking generally, explain the simplicity of its mechanism, demonstrate the fact that, on balance, meters favour the consumer rather than the seller, and point out that there is always a percentage unaccounted-for as between the works' meters and the aggregate of the consumers' meters—the doubting consumer, after the necessary exercise in decimals has been explained to him, may be converted into that great asset of every business, a consumer who has confidence in its integrity and is satisfied with its service.

THE ASSISTANCE OF THE "B.C.G.A."

The B.C.G.A. is preparing on these lines literature for the assistance of those engaged on the commercial side, which it is hoped will prove useful.

On the competitive side, charging per therm does not make comparisons between gas and electricity any simpler than before, as allowances for varying efficiencies of conversion from potential heat to actual light, heat, and power have to be made. Speaking in averages, a therm has to be compared in regard to cost with 5 units of electricity for light, 10 units for power, and 20 units for cooking and heating; and to explain this to a consumer it will be necessary to convert the figures into terms of cubic feet, with which he is familiar, from therms with which he is not. This, as well as the explanation of the alteration in the method of charge, will certainly make publicity for some time more necessary than ever; and the B.C.G.A. will do the very best it can with the means at its disposal and will give the fullest possible assistance to all its members. It is fortunate that the Act, besides imposing on the commercial departments and organizations of the industry the need for greater activity, affords undertakings the financial relief which will encourage them to invest money in the profit-earning work of commercial development.

But the drawbacks which so obviously attend an alteration in the method of charge (that was not a necessary corollary to the general adoption of a thermal standard for gas supply), prominent as they are at the moment to all engaged in the sale of gas, are, as I said at the beginning, largely of a temporary nature, and must not be allowed to obscure the many immediate and potential advantages of the Act which has given rise to them.

FREEDOM AND ENTERPRISE.

If, by giving the industry a wide measure of freedom and so encouraging research and enterprise in the fields of gas manufacture and utilization, the Act enables, as we all hope and believe it will enable, the industry to give the public better value for less money, and to assist the nation to make better use of its precious fuel and chemical resources, the Gas Regulation Act will indeed be proved to have founded a new epoch in the commercial and industrial history of the country, and will provide a stimulus to every one of us to make our policy and our methods worthy of a live and progressive industry.

GAS LIGHT AND COKE COMPANY.

Annual Report and Accounts.

THE following is the report of the Directors of the Gas Light and Coke Company for the year ended Dec. 31, which will be presented at the ordinary general meeting next Friday.

The accounts for the year show that, after providing for the payment of 3 p.ct. per annum on the ordinary stock for the June half year, and of £2 12s. 6d. p.ct. per annum on the 3½ p.ct. maximum stock for the June and December half years, and allowing for fixed charges, there is a total available balance of £571,082 11s. 9d., out of which the Directors recommend the payment of a dividend on the ordinary stock for the December half year at the rate of 3 p.ct. per annum, which will absorb £244,484 12s. 6d., and leave £326,597 19s. 3d. to be carried forward to the credit of the current year. These dividends on the 3½ p.ct. maximum stock and on the ordinary stock are payable under the Statutory Undertakings (Temporary Increase of Charges) Act, 1918.

There has been during the year an addition to the number of the Company's consumers of 9331, and an increase of 32,238 in the number of gas-stoves sold and let out on hire.

Compared with the corresponding periods in 1919, the sale of gas for the June half year showed an increase of 6½ p.ct.; for the December half year, of 3 p.ct.; resulting in an increase for the year of 4¾ p.ct.

The price of gas throughout the year remained at 4s. 8d. per 1000 c.ft.; but, as announced at the last annual meeting, the Directors, in consequence of a special allowance made by the Government in the price of coal, were able to grant rebates on the price of gas supplied for domestic consumption for practically half the year. The sum so distributed amounted to no less than £457,387 5s. 1d. The Directors regret that they must now advance the price of gas to 5s. 6d. per 1000 c.ft., in view of the serious reduction in the revenue caused by the fall in the price of residuals generally, and especially in the price of coke for export.

With regard to labour, considerable increases were made in wages under national awards of January and March, and under the national agreement of July.

In May, the Government introduced their promised Bill to deal with the financial position of gas undertakings generally. Eventually the Bill, which will form a new charter for the gas industry, received the Royal Assent, as the Gas Regulation Act, 1920, on Aug. 4. The Act provides for the sale of gas on the basis of heat units (of which 100,000 are to be known as a "therm"), instead of by volume (cubic feet), and gives power to the Board of Trade to make Orders amending standard and maximum prices of gas, so that the increased cost of supplying gas, experienced in consequence of the war, may no longer detrimentally affect the financial position of gas undertakings.

The Directors have applied to the Board of Trade for the necessary Order under the Act; and this may be expected shortly.

DAVID MILNE WATSON, *Governor.*

Horseferry Road, Westminster, S.W., Jan. 21, 1921.

The Accounts.

The statement of capital (stock) sets forth that the total paid-up is £10,413,480; added on conversion, £12,832,955—total amount authorized, £23,246,435. Deducting the amount redeemed, £285,225, the total amount of the Company's existing capital powers is £22,961,210. The statement of loan capital stands thus: Total paid-up, £3,186,660; added on conversion, £1,618,190; unissued, £750,000—total amount authorized, £5,554,850.

The capital account shows receipts (with premiums, £1,688,958) to the amount of £29,455,017. The expenditure is shown in the following items:

Expenditure to Dec. 31, 1919			£14,633,139 6 3
Expenditure during the year to Dec. 31, 1920,—viz.			
Lands acquired, including law charges	£8,207 8 6		
Buildings and machinery in extension of works	255,081 7 9		
New and additional mains and service-pipes	69,072 8 7		
Do. do. meters	37,078 16 4		
		369,440 1 2	
			£15,002,579 7 5
By stoves returned from hire	£16,390 11 4		
Do. sold	174,800 8 10		
„ depreciation of meters and stoves	131,758 0 0		
		322,949 0 2	
Total expenditure			£14,679,630 7 3
Nominal amount added on conversion			14,451,145 0 0
			£29,130,775 7 3
Deduct amount of capital redeemed under the Company's Act of 1903			285,225 0 0
			£28,845,550 7 3
Balance of capital account			609,467 7 5
			£29,455,017 14 8

The total of the net revenue account is £1,237,506. The following statement shows how it is proposed to appropriate it:

Year, 1919.			
£153,245	..	Interest on debenture stocks and bonds for the year	£153,245 10 0
162,489	..	Dividend on the 4 p.ct. consolidated preference stock for the year, £162,489 8s.	
68,792	..	Dividend on the 3½ p.ct. maximum stock for the year, £68,250	230,739 8 0
231,281			
33,141	..	Interest on temporary loans and sundry funds, less credits	37,954 0 8
£3 p.ct. 244,485	..	Dividend on the ordinary stock, June half year, 1920 (3 p.ct.)	244,484 12 6
568,456	..	Balance applicable to dividend on ordinary stock, December half year, 1920	571,082 11 9
£1,230,608			£1,237,506 2 11

The three statements relating to the reserve, special purposes, and depreciation funds stood as follows on Dec. 31: Reserve fund, £88,023; special purposes fund, £373,867; depreciation fund, £97,642.

REVENUE ACCOUNT.

Expenditure.

Year, 1919.		£ s. d.	£ s. d.
£4,033,769	Manufacture of gas— Coal, including expenses	5,318,863 13 10	
382,879	Oil ,, ,, less value of oil tar	215,823 17 11	
335,022	Coke, &c., used in the manufacture of carburetted, &c., water gas	335,169 0 9	
50,501	Salaries of engineers and other officers at works	65,435 1 10	
538,761	Wages	662,502 3 2	
59,252	Purification	75,097 19 9	
1,408,955	Repair and maintenance of works and plant, materials, and labour, less received for old materials, £37,601 18s. 10d.	2,247,597 13 10	
	Distribution of gas—		8,920,486 11 1
250,522	Salaries and wages of officers (including rental clerks)	315,391 10 4	
377,206	Repair and maintenance of mains and service-pipes, &c.	596,308 9 2	
292,348	Repair and renewal of meters	398,681 2 8	
300,545	,, ,, stoves	386,173 18 11	
18,345	Fitting up automatic meter supplies	19,941 6 1	
			1,716,496 7 2
118,997	Public lamps—lighting and repairing	..	173,521 15 1
	Rents, rates, and taxes—		
15,361	Rents payable	15,712 18 2	
446,380	Rates and taxes	574,633 9 5	
			590,346 7 7
	Management—		
7,500	Directors' allowance	7,500 0 0	
600	Company's Auditors	600 0 0	
33 005	Salaries of management staff	44,147 6 4	
128,272	Collectors and cashiers	153,331 13 5	
21,515	Stationery and printing	34,053 7 3	
26,451	General charges	40,395 18 10	
			280,028 5 10
36,439	Co-partnership	..	42,877 7 4
1,253	Parliamentary charges	..	193 0 0
434	Law charges	..	656 12 5
—	Charges *re* quinquennial re-valuations	..	2,000 0 0
6,692	Bad debts	..	5,267 18 10
1,000	Depreciation fund for works on leasehold lands	..	1,000 0 0
87,422	Annuities to officers and workmen, including contribution to officers' superannuation fund	..	116,670 9 3
4,832	Allowances to employees on active service	..	204 4 5
6,930	Workmen's compensation	..	7,798 19 2
10,278	Company's Contribution under National Insurance Act, 1911	..	16,306 1 2
	Public officers—		
1,531	Gas Referees and Official Auditor	1,929 7 7	
1,168	Public testing-stations	1,505 16 9	
			3,435 4 4
9,004,165			11,877,286 3 8
849,864	Balance carried to net revenue account		913,535 2 9
9,854,029			12,790,821 6 5

Total Wages Paid, 1920 £3,415,706 6 8 Total Salaries Paid 1920. £429,329 3 6
1919 £2,605,779 0 8 1919. £317,977 11 11
1913 £1,064,079 4 3 1913. £190,656 16 8

Revenue.

Year, 1919.		£ s. d.	£ s. d.
	Sale of gas—		
£6,403,358	Per meter at 4s. 8d. per 1000 cubic feet	7,094,524 4 3	
124,769	Public lighting and under contracts	171,826 13 4	
6,528,127			7,266,350 17 7
160,612	Rental of meters	..	162,891 12 11
191,866	Rental of stoves	..	190,745 14 2
235,588	Rental of fittings	..	313,235 12 1
	Residual products—		
2,021,667	Coke, less labour, &c.	3,662,610 6 10	
96,848	Breeze, less ,, ,,	158,299 8 5	
310,554	Tar and tar products	690,330 7 8	
290,404	Ammoniacal liquor and sulphate of ammonia	327,974 3 7	
2,721,473			4,839,214 6 6
15,842	Rents receivable		17,778 18 8
521	Transfer fees		604 4 6
9,854,029			12,790,821 6 5

The remaining statement is the balance-sheet, which gives the value of the stores on hand at the close of the year as follows: Coal, £543,525; gas oil, £262,334; coke, £123,258; tar and ammoniacal liquor and products, £172,163; and sundries, £896,270. The figures this time last year were: Coal, £274,218; gas oil, £88,701; coke, £60,897; tar, ammoniacal liquor, and products, £146,420; sundries, £639,645.

Statement of Coal.

—	In Store Dec. 31, 1919.	Received During Year.	Carbonized During Year.	Used During Year.	In Store Dec. 31, 1920.
	Tons.	Tons.	Tons.	Tons.	Tons.
Coal	164,735	2,349,758	2,279,253*	3850	231,390

* In addition to this quantity of coal, 6,251,005 gallons of oil have been used during the year.

Statement of Residual Products.

Description.	In Store, Dec. 31, 1919.	Made During Year.	Used During Year.	Sold During Year.	In Store Dec. 31, 1920.
Coke—tons	30,349	1,469,220	235,724	1,203,218	60,627
Breeze—tons	84,323	253,344	43,681	272,044	21,942
Tar, from coal only—galls.	1,958,787	20,421,434	20,157,913	7,601	2,214,707
Ammoniacal liquor—butts	27,909	559,162	555,879	..	31,192

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold. Public Lights and Under Contracts (Estimated).	Private Lights (per Meter).	Total Quantity Accounted for.	Number of Public Lamps.
Thousands.	Thousands.	Thousands.	Thousands.	
* 35,148,709	964,548	30,998,995	32,517,869	44,479
† 33,255,720	721,934	29,786,955	30,995,222	44,543

* Including 7,350,793,000 c.ft. of carburetted, &c., water gas. † Year 1919.

Distribution of Sulphur in Coal.

Messrs. H. F. Yancey and T. Fraser, of the Experimental Station of the United States Bureau of Mines, have described work undertaken by them for the purpose of studying the distribution of pyritic and organic sulphur in coal as it occurs in various sections, layers, or benches of the coal seam. Sulphate sulphur was entirely disregarded, because it was found to be very low in freshly-mined coal. It is well known that the variation of total sulphur between sections or benches of the same bed at a given place, in any except low-sulphur coals, may be quite marked. The conclusions at which the authors arrived as the result of their investigations are that extreme irregularity of distribution is characteristic of the pyritic sulphur of coal. This offers a possibility of securing a low-sulphur product by separate mining of parts of the seam. In comparison with the large variations of pyritic sulphur in the vertical span of the bed, the organic sulphur is quite uniform. There is little evidence of any definite relationship in the occurrence of organic and of pyritic sulphur. High-pyritic sulphur in a bench or section of the bed is not indicative of high organic sulphur content. The proportion of the sulphur that is in organic combination in different raw coals varies within wide limits. High-sulphur coals are ordinarily higher both in organic and pyritic sulphur than low-sulphur coals, though organic sulphur makes up a greater percentage of the total sulphur in the case of low-sulphur coals. The organic sulphur content of some coals is sufficiently high to limit seriously the extent to which these coals can be cleaned of sulphur by washing.

Determination of Carbon Dioxide in Coal.—A method for the accurate determination of carbon dioxide in carbonates, which has been evolved by Mr. F. S. Sinnatt, M.B.E., M.Sc. (Tech.), F.I.C., M.Inst.Min.E., and Mr. W. Harrison, F.C.S., forms the subject of Bulletin No. 7 of the Lancashire and Cheshire Coal Research Association; the President (Mr. R. A. Burrows) explaining in a note that the work described appeared to the Association to be of sufficient interest to warrant a wider circulation. It has therefore been published, at the price of 1s. per copy. Applications for copies should be addressed to Mr. Sinnatt, at the College of Technology, Manchester.

Enriching Artificial Gas with Natural Gas.—The project of enriching artificial gas with natural gas is, says Mr. J. B. Garner, of widespread interest, because of the possibility it offers of providing a supply of clean domestic fuel gas, uniform in quality, and of sufficient volume to meet the requirements of the public. Natural gas as produced in the Appalachian and Mid-Continent fields of America, has an average heating value of 1100 B.Th.U. per cubic foot; so that less than 80 c.ft. of natural gas has an enriching value equal to a gallon of gas oil. Natural gas can be mixed with blue water gas easily, safely, and without any overhead production and depreciation charges, and is therefore the ideal enricher of water gas in regions where natural gas is available. Natural gas companies should no longer sell their product at ridiculously low rates, but should utilize it in the best possible way—as a means of enriching artificial gas. Such use of this natural resource will ensure to the public, for many years to come, a supply of gas at a cost otherwise impossible.

A Large Coke Transporter Bridge.—The "Technical Review" gives brief particulars, taken from "Der Eisenbau," of a 4½-ton transport crane with a span of 117 ft., at the Dusseldorf Gas-Works. The bridge has a clear height of 78 ft. 9 in., and a total length of 275 ft., including the projections beyond the supports in front and rear. The travelling jib is supported from the lower flange of a horizontal lattice girder, which in turn rests on steel lattice towers; while a 40 H.P. motor propels the bridge and the towers at a speed of 46 ft. per minute. The jib itself is supported on rollers, and may be propelled at a speed of 308 ft. per minute by a 24 H.P. motor. Turning movements are controlled by a 6 H.P. motor, and hoisting and lowering by a 60 H.P. motor at a velocity of 131 ft. per minute. The movement of the travelling jib and the speed of lowering can be instantly regulated by means of powerful brakes. A new type of automatic grab, having a capacity of 4 cubic yards, is fitted to the crane. The lower part of one of the supporting towers is cased-in with steel plates to form a coke-bunker of 33 cubic yards capacity, and is fitted with a special outlet opening and sliding-door for loading direct into cars.

COKE-OVEN MANAGERS' ASSOCIATION.

(MIDLAND SECTION)

The Monthly General Meeting of the Midland Section of the Coke-Oven Managers' Association was held at the Queen's Hotel, Barnsley, on Tuesday of last week. There was a very good attendance, which was presided over by Mr. T. B. SMITH, of Stocksbridge.

Mr. M. E. NICKLIN, of the Wombwell Coke and Bye-Product Company, Ltd., read the following paper:

THE MANUFACTURE OF SULPHATE OF AMMONIA.

The world position to-day with regard to sulphate of ammonia is such that, in the near future, only neutral and dry sulphate of ammonia will find a market. This is largely due to the fact that synthetic methods for the production of artificial fertilizers have been brought to such a state of perfection that these fertilizers can be put on the market at a competitive price; and, further, that the users of sulphate have found that quality and mechanical condition play a very important part in the application of the salt to the land. I therefore propose to outline to you the various processes by which sulphate is usually manufactured at modern coking-plants, with a view to bringing-out the best possible way of arriving at the best possible results.

The principle involved in the manufacture of sulphate of ammonia is shown in the simple equation: $2NH + H_2SO_4 = (NH_4)SO_4$. The difficulties of bringing this about, however, in dealing with the manufacture of sulphate as a bye-product of the carbonization of coal, are many and complex. I need hardly remind you that the ultimate fate of all our bye-products is decided at the coke-ovens. Here our raw materials are made; and, obviously, what occurs in the oven is vital to the success of the subsequent processes. I should like, therefore, to emphasize the conditions which promote the maximum production of ammonia in the carbonization process.

The decomposition temperature of ammonia is well-established—viz., 750° to 800° C.; and this is much below the required temperature for the manufacture of our prime product—metallurgical coke. All we can do is to take care that our ammonia is subjected to this temperature for an absolute minimum of time; and this is best achieved by seeing to it that the ovens are well filled with coal, and that the gases as they are evolved are withdrawn from the ovens with the minimum contact with highly-heated surfaces. Equal and regular pressures throughout the battery, which can only be achieved by clean ascension pipes and mains, have a serious influence on the production of ammonia. The protective influence of steam, though useful, is accidental.

I propose now to describe the "indirect," "semi-indirect," and "direct" processes of sulphate of ammonia manufacture.

THE INDIRECT PROCESS.

This process is the one in most general use; and consequently its main features are well known, and are based on well-established principles. The ammonia in this process is abstracted from the gas in two portions: (1) The condensates produced in the cooling plant give a solution which contains chiefly the fixed ammonia compounds; (2) the remainder of the ammonia is recovered by scrubbing the gas with water. These two are usually mixed together, and on coking plants give a final liquor containing (say) 1·20 p.ct. of total ammonia. On a plant producing 3 tons of sulphate of ammonia per day, this means that approximately 70 tons of liquor have to be treated per day. The liquor is passed through a still of the continuous type; and for the complete removal of the ammonia, "milk of lime" is added at the appropriate time to decompose the fixed ammonium compounds. The amount of milk of lime so added will vary for different liquors, and lies between 10 and 20 p.ct. by volume of the liquor distilled—thus increasing the volume of liquor passing through the still to about 80 to 90 tons per day.

The success of the process depends very largely on the efficiency of the men engaged thereon, as all the principles involved in it are of a physical nature, save the simple reaction between the ammonia and the sulphuric acid. That is, at the scrubbing plant the temperatures of the gas and water must be carefully maintained at the lowest practical point, and at the still careful regulation is essential to avoid ammonia passing with the waste liquors. Uniform conditions must also prevail; otherwise the sulphate produced may be "white" or may be "blue." In short, the personal factor enters very largely into the success of the process.

The process possesses many admirable features—chief among them being the fact that it is in a way independent of the main carbonizing process, and can be temporarily suspended (say) for repairs or the cleaning of the plant, shortage of acid, lime, &c., without undue loss of output. It has the further advantage that, with slight alterations, it can be quickly converted into a process for the manufacture of concentrated liquor. Its most serious drawback lies in the fact that the waste liquors—unfortunately, produced in large quantity—contain some substances of a nature deleterious to agriculture whose disposal often presents a big problem to those responsible for the process. This feature of the plant, together with the fact that the distillation of weak liquor entails the use of a great amount of steam per ton of sulphate produced, is largely responsible for the later semi-direct and direct processes for the manufacture of sulphate which have been developed in recent years.

The control side of the indirect process requires very careful attention both day and night (otherwise considerable losses may occur); and it is essential that hourly samples of the liquor leaving the still should be tested, and any fault immediately rectified. A rapid and accurate method for the analysis of waste liquor lies in the use of the "Azotometer," in which apparatus the ammonia is rapidly decomposed to nitrogen by the use of sodium hypobromite—the operation occupying (say) only a minute per test. In this way a large number of samples can be dealt with in a short time. Its value on the large plants cannot therefore be exaggerated.

Labour enters very largely into the success of all processes. The indirect process, on normal-sized plants, requires the services of two men in the process house alone, to attend to the many duties involved. Periodical cleaning and dismantling of the stills calls for more labour and expense in stores.

I should summarize the advantages of this process as follows: (1) The general elasticity of the process—*e.g.*, stopping for repairs of materials used; (2) its easy conversion into processes for the manufacture of alternative compounds, or other forms of ammonia, should the demand for sulphate fluctuate.

The disadvantages of the process I should summarize as follows: (1) The liability to loss of ammonia (*a*) at the scrubbers, (*b*) in the storage tanks by evaporation, (*c*) at the still, in the waste liquors; (2) high labour costs, working, and repairs; (3) high consumption of steam, amounting to at least 8 tons of steam per ton of sulphate produced; (4) the production of large quantities of waste liquor of an objectionable nature—difficult, in most cases, to dispose of; (5) the liability of producing discoloured sulphate through (*a*) faulty working of the still, (*b*) irregular working of the saturator.

The introduction of the semi-direct and direct processes is the logical outcome of a study of the foregoing conclusions.

THE SEMI-DIRECT PROCESS.

The pioneers of the semi-direct process, I venture to state, had primarily in view the elimination of all effluents of a disagreeable nature which were associated with the then known methods of bye-product recovery. The first difficulty met with was the successful removal of the tar from hot gases. It is well known that the removal of tar from crude coal gas has always been accomplished as a subsidiary to the general cooling-down of the gas in the ordinary process of gas manufacture—that is, its removal was effected without any special catering for itself in particular. Further, all coals contain more or less water; and water is produced in the destructive distillation of coal. This water is subsequently condensed from the gas, in the cooling plant, and on condensing brings down with it all the fixed ammonia and a substantial proportion of the free ammonia.

The following table shows the nature of the ammoniacal liquor deposited in the cooling plant of an indirect or semi-direct plant, giving the temperature of the crude gases entering and leaving the coolers.

Condenser No.	Per Cent Ammonia.			Per Cent. on Total.		Inlet Gas Temperature ° C.
	Free.	Fixed.	Total.	Free.	Fixed.	
1	0·272	0·136	0·408	66·66	33·34	134
2	0·274	0·102	0·476	78·59	21·41	62
3	0 680	0 085	0·765	88·88	11·12	56
4	1·224	0·119	1·342	83 68	16·32	50
5	2·329	0·102	2·431	95·80	4·20	33
6	4·301	0·102	4·403	97·68	2·32	21
						Exit 15·5

The early attempts at direct recovery, therefore, consisted of bringing the hot crude gases into contact with sulphuric acid prior to the removal of the tar. This was unsuccessful, owing to the fact that the sulphate was so contaminated with tar as to render it unsaleable.

The question then became one of either perfecting a process for removing tar from hot gases, or, alternatively, carrying on as before—removing the tar by condensation, passing the gas through the acid bath instead of water scrubbers, and treating the condensed ammoniacal liquors from the coolers in the usual way, with steam and lime, and passing these vapours, along with the gas from the coolers, into the saturator. In short, half the ammonia was recovered direct from the gas, and the other half by the ordinary distillation of ammoniacal liquor. Hence the term "semi-direct" process.

The obvious gain in using this process is that there is a greatly reduced quantity of effluent, due to the smaller amount of liquor to be distilled, and also a direct saving of steam. Scrubbing apparatus is entirely dispensed with, representing a still further saving of steam and plant. On the other hand, the process requires the same attention to detail as is necessary on the indirect plant, for the same operations are carried out, *plus* the addition of passing the gas through the acid bath.

The process does not present a complete solution of the effluent problem; and to this extent, in the opinion of the writer, it does not go far enough. The same liability of loss at the stills is present in this as in the indirect process, and also faulty working of the still is likely to produce discoloured sulphate, as the still, owing

to the reduced amount of liquor, only works intermittently. Conditions are not constant; and this, I suggest, is one of the main causes of blocked saturators, which occur on some plants of this type. This process is, however, a distinct step forward in the simplification of sulphate manufacture at coke-ovens.

Its advantages I should summarize as follows: (1) Reduced capital cost of plant by the elimination of scrubbers, pumps, &c.; (2) saving in steam consumption on account of the reduced production of liquor; (3) reduced amount of effluent for subsequent disposal.

Its disadvantages are: (1) The personal factor still remains to an important extent; (2) the effluent problem still remains; (3) the gas has to be cooled twice over—first for the extraction of the tar, and again subsequent to scrubbing for benzole.

The Direct Process.

Under this heading can be included those processes which succeed in the production of sulphate of ammonia without the intermediate production of ammoniacal liquor, and also those processes of recent invention which result in the production of sulphate without the production of ammoniacal liquor, and also without the aid of sulphuric acid from outside sources—that is, the ammonia is fixed by the sulphur which is evolved from the original coal.

The successful working of a direct sulphate of ammonia process is dependent upon the following factors: (1) The satisfactory elimination of the tar from the hot crude gases without the deposition of ammoniacal liquor; (2) the elimination of ammonium chloride where this is present to any extent; (3) the removal of the naphthalene and light oils from the gas after the gas has left the saturator.

To remove the tar satisfactorily from hot coke-oven gases without the condensation of water, it is obvious that the gas must not be cooled-down below its dew-point, which will naturally vary according to the degree of saturation of the gas with water vapour. It is, however, found that this point is generally below 80° C.; and it is therefore possible to reduce the gas down to this temperature for the tar-extraction process. At this temperature the bulk of the heavy tar will condense out of the gas, and can be removed by simply passing the gas through a static apparatus of such design as to cause the small particles of tar to come together and combine to form a stream or film of tar on the vessel, from which they are drained in the usual way.

In the Simon-Carvès process the heavy tars are removed from the gases by passing them into a vessel of conical shape, in which the gases are given a high velocity, and caused to revolve after the manner of a cyclone; while at the same time a spray of hot liquor under pressure is pumped into the vessel—the liquor assisting the tar extraction, and also serving to collect the fixed ammonia compounds, which consist chiefly of ammonium chloride. The remaining tar fog is extracted by mechanical means. In the process named, the gas is passed through a dynamic extractor in which very rapid rotary motion is imparted to the gas by means of vanes of special construction, revolving at a peripheral speed of about 200 ft. per second. Hot liquor under pressure is also pumped into the vessel, performing the same functions as in the cyclonic extractor. The separated tar is drawn off from the bottom of the vessel, and is added to the tar extracted in the first stage of the process. The gas leaving the vessel is sufficiently free from tar and oils to produce a salt of high quality when passed through the saturator. The ammonium chloride, where present, is also completely removed simultaneously with the tar—so completely that no subsequent trouble occurs, due to corrosion by hydrochloric acid, which would, of course, take place were the chloride allowed to pass into the sulphuric acid. It is possible to obtain a solution containing 15 p.ct. saturation of ammonium chloride without undue wear and tear of the apparatus generally.

Owing to the temperature at which the tar extraction takes place, the gas entering the saturator contains a quantity of light oils and naphthalene, which, however, pass through the saturator practically unaltered, and are removed without difficulty in the subsequent cooling plant, prior to the benzole recovery plant. In the Simon-Carvès process this separation is brought about by washing the gas, when it has attained a temperature of 40° C., with a limited amount of creosote oil, which, as soon as saturated, is withdrawn from circulation, and either added to the tar or the naphthalene recovered by crystallization. In the Otto direct process the naphthalene is successfully removed by passing the gases upwards through a tall tower (similar to a benzole scrubber, but containing no grids), and at the same time allowing cold water to descend. The naphthalene is separated from the gas by the sudden shock so produced.

The effluent water produced in both these types of direct plants is of a harmless character. It can be easily separated from the contained oils and naphthalene, and finally disposed of by using it for coke quenching. The direct process, therefore, produces no noxious effluent, which could only be disposed of with great difficulty and expense.

The advantages of direct recovery are: (1) Great saving in ground-space and asparatus—*e.g.*, pumps, scrubbers, storage tanks, stills, &c.; (2) no ammoniacal liquor is produced which requires distillation; (3) considerable saving in labour and reduced cost of upkeep, owing to simplicity of design and compactness of plant; (4) a large saving in steam, due to the absence of stills, pumps, &c., and the extraction from the gas, without cooling, of the tar; (5) the entire absence of waste liquors of a disagreeable character; (6) increased yield of sulphate, or its equivalent, due to the elimination of losses by evaporation, which necessarily occurs in both the other systems, due to the enforced storage and manipulation of the ammoniacal liquor; (7) the direct process makes it possible to separate the ammonium chloride from the gas, and subsequently to recover the chloride by simple evaporation, thus producing a salt of a high marketable value at a very low cost—a fact worthy of notice at the present time, in view of the claims now being put forward as to the value of this substance for agricultural purposes; (8) supervision and chemical control are reduced to a minimum, the plant being so simple to operate as to be almost "fool-proof."

Acidity of the Bath.

With reference to the question of the control of sulphate plants generally, I should like to say a word as to maintaining the required acidity of the bath. On indirect plants the method is usually to work on the twaddel of the bath, periodically to make up the bath with acid to a definite twaddel, and then allow the bath to work for a period until the "salting" takes place, taking care that the twaddel does not get below another definite point, which two points will probably vary slightly with different plants. The actual acidity of the bath is tested very rarely, if at all. To my mind this is wrong. In working on direct plants in particular, I have found that it is likely to lead to losses of ammonia, due to the bath becoming neutral without any indication in the way of reduced twaddel.

I therefore recommend and adopt on the plant under my control the taking of hourly titration tests, using caustic soda solution of normal strength. The tests are easily carried out by the man in charge of the process, who works between a maximum and minimum titration test. The twaddel is also taken hourly at the same time as the titration test; and the two figures together give a good indication both of the acidity of the bath and the degree of saturation of the mother liquor. The men readily understand this simple test; and, in fact, I believe that a little interesting work of this kind tends to promote on the part of the men a keenness which is otherwise absent.

One of the most troublesome questions in the manufacture of sulphate of ammonia is that of blocked saturators; and no doubt there will be many and varied theories as to the cause and cure of this annoying occurrence. Very often it is a question of the design of the saturator—such as faulty distribution of gas or ammonia vapours, and faulty elimination of the crystallized salt from the saturator, due either to a defective ejector or to the fact that salt is allowed to accumulate in the saturator. These are matters of design which could be studied and necessary alterations made to eliminate the causes. I also think that blockages occur in many well-designed saturators having no relation to any mechanical defect, but solely due to the method of working. In this connection I have found that the temperature prevailing in the bath plays a very important part, also the "solvency" of the liquor contained in the bath. Irregular working is also a prolific cause of blockages. Too low prevailing temperatures favour blockages. Where this has been the cause, increase in the temperature of the bath has removed the trouble.

"Solvency."

Under this term I contend that, by periodically raising the acidity of the bath, any salt tending to set in the apparatus is redissolved by the added acid, and prevented from accumulating to such an extent as to cause trouble. By keeping the acidity of the bath between two narrow limits—such as from a maximum of 5 p.ct. to a minimum of 3 p.ct.—blockages may occur, as the salting is almost continuous. In such a case, by widening the limits to (say) a maximum of 10 to 15 p.ct. free acid, and working down to 3 p.ct., the trouble would probably disappear.

Irregular working is more likely to occur in the semi-direct process than in either of the other two—that is, there may be periods when gas only is being passed into the saturator, and at other times both the gas and the ammonia vapours and steam from the still. The temperature of the gas will not be so constant as in the direct process, as in the one case the gas is reheated prior to entering the saturator, and in the other the temperature of the gas will vary only very slightly, and this will usually be due to any increase or decrease in the make of gas at the ovens.

Blockages have been frequent on semi-direct saturators, due in my opinion to the above causes; and to those who may have trouble in this connection I would suggest that they study the question of regular working with even and sufficiently high prevailing temperatures, when I believe the trouble would be considerably reduced, if not completely removed.

Neutral Sulphate of Ammonia.

In conclusion, the matter requiring our most urgent attention at the present time is the production of a dry, neutral salt. A large amount of work has been done in this connection recently, and full accounts have been published in the Technical Press. Various methods are recommended by different investigators—including the spraying of the sulphate with prepared ammoniacal liquor during the whizzing operation, or the addition of alkalies, either in the dry state or in solution, and also treating the sulphate with hot ammonia gas in a combined neutralizing and drying machine.

It behoves all of us who have charge of sulphate of ammonia processes to work on some lines with the object of putting on the market dry, neutral sulphate. The spraying with ammoniacal liquor is easily accomplished at works using either the indirect or

semi-direct processes; but it is not so easily done on a direct plant where ammoniacal liquor is not available without providing some special means for its production. We therefore tackled the matter at Wombwell to see if the sulphate could not be recovered in the neutral state without the aid of ammonia; and after experimenting with water-spraying eventually we found that, by using a special form of spray constructed on the lines of a laboratory blow-pipe, and worked with compressed air in such a manner that a fine atomized spray of water is produced, and applying this spray to the sulphate in the whizzer after the mother liquor has ceased to run, we could produce sulphate containing 0·01 p.ct. of free acid, which is well within the specified acid-content allowed in neutral sulphate. We are still working on this question with a view to getting a constant method of applying the system, so as to prevent irregular results, at the same time avoiding the over-production of mother liquor, which is, of course, a very important point.

I believe, ultimately, the successful neutral sulphate on direct plants will be produced in two stages: (1) The spraying of the sulphate with a fine spray of water; and (2) the drying of the sulphate in a machine along with the addition of the requisite amount of alkali. In any case, the question is a vital one at the present time, and one which should command the attention of every member.

An interesting discussion followed the reading of the paper; and general agreement was expressed with the author's views on the cause and cure of the various difficulties met with in sulphate of ammonia plants.

A hearty vote of thanks was accorded Mr. Nicklin, on the proposition of Mr. C. P. FINN, B.Sc. (Manvers Main), seconded by Mr. SYLVESTER (Rockingham).

Carbonization of Canadian Lignite.

The Lignite Utilization Board of Canada was created in 1918, to establish an industry for the conversion of the low-grade lignites of Southern Saskatchewan and elsewhere into a high-grade domestic fuel by means of carbonization and briquetting. The progress of the investigations made (up to the point of starting operations with a semi-commercial scale carbonizer at Ottawa) is detailed in a paper by Mr. Edgar Stansfield, who says the primary object of the Board is to produce a domestic fuel from Souris lignite, which, when mined, contains 30 to 35 p.ct. of inherent moisture. It loses its moisture rapidly when exposed; and the lumps then disintegrate. Unless other reasons are found to outweigh this, it is, of course, desirable to carbonize the lignite in such a way as to leave the residue with a maximum calorific value. It has been shown that this is accomplished by complete carbonization at a temperature of about 575° C., and that the same result can be approximated by short exposure in a very thin layer to a distinctly higher temperature. As the object to be attained is to bring all parts of the mass to the same temperature, a somewhat thicker layer continually stirred should give the same result as a thinner layer at rest. No increase in the yield of bye-products can be attained without a corresponding decrease in the yield and calorific value of the residue. The gas obtained at the above temperature is barely sufficient to provide the heat necessary for the operations of drying and carbonizing the lignite. The tar yield is also low. None of the results gives any indication that the use of vacuum, pressure, steam, or other modified method of carbonization would have any economic advantage. Souris lignite does not soften or become sticky at any stage of its carbonization. This is in marked contrast to the behaviour of bituminous coal, and permits a design of carbonizer which is simpler and cheaper than can be employed for the latter material.

Performance of Steam-Boiler Plants.—There has been continued in the pages of "Engineering" the publication of the series of articles dealing with exact data on the performance of steam-boiler plants, by Mr. David Brownlie, B.Sc.Hons. (Lond.), F.C.S., Assoc.M.Inst.Mech.E.; and reprint No. 4, which discusses average figures for the performance under ordinary working conditions of some different types of steam-boilers, is just to hand. Figures of this description, he claims, are of practical interest because, as already shown in previous articles, probably over 95 p.ct. of the boiler plants of Great Britain are run almost entirely in the dark as to their performance. Consequently, rule-of-thumb figures have to be used instead of exact ones, when deciding upon the erection or enlargement of boiler and power plants. The whole principle is, Mr. Brownlie says, thoroughly wrong and unscientific, and is rendered still further so by the fact that much of this rule-of-thumb data is hopelessly inaccurate. Since, however, it is tolerably certain that such methods will generally continue to be used for many years, at any rate the least that can be done is to employ reasonably accurate data; and his object is to supply such data, while recognizing at the same time that, even with fairly accurate data, the whole system is not in accordance with modern methods of economical steam generation. Mr. Brownlie gives data based on about twelve years' continuous experience of testing and re-organizing existing steam-boiler and power plants and in designing new plants, and includes the complete scientific investigation of nearly 500 steam-boiler plants in about fifty different industries, together with the inspection of about 2000 plants. Steam users will therefore study his figures with interest.

GAS-FIRING ON THE BONECOURT SYSTEM.

In the belief that that part of the country has as yet had no experience in the application of Bonecourt principles to steam generation, either from using gaseous fuel or from waste heat, Major Gregson, B.Sc., Assoc.M.Inst.C.E., Assoc.M.Inst.Mech.E., some time ago read a paper before the South Wales Institute of Engineers on "Recent Developments in Gas-Firing Steam-Boilers, and in the Utilization of Waste Heat, on the Bonecourt System." The paper, which is reprinted in Vol. XXXVI. [No. 2] of the Institute's "Proceedings," gives a short description of the later types of boilers working on this system, and of the results which have been obtained.

The author stated, as has already been pointed out in the pages of the "JOURNAL," that Bonecourt gas-fired boilers, up to an evaporation of 1500 lbs. of steam per hour, are now constructed to work on natural draught. The thermal efficiency is slightly lower than is the case with the larger units worked on mechanical draught; but, of course, the necessity for a fan and motor is done away with. A number of these small boilers are at work on town gas, and are proving immensely popular. An efficiency of 86 p.ct. (without a feed-water heater) is obtainable on these small natural-draught units. The addition of a fan, *plus* a feed-water heater, brings this figure up to approximately 93 p.ct. The high thermal efficiency of the Bonecourt boiler in its present form can be attributed to two factors: (1) Perfect combustion with very little excess air; and (2) rapid heat transference to the water—by radiation as well as by conduction.

As to the utilization of waste heat, Major Gregson said it seems to be a common fallacy to suppose that any ordinary boiler will work efficiently as a waste-heat boiler; whereas, as a matter of fact, the relations between the surface exposed to gases, length and diameter of tubes, and draught need careful investigation for each individual case, if really efficient results are desired. Owing to the fact that air cannot leak into the waste gases, and so cool them, the fire-tube boiler is the best type of boiler for this class of work, especially when operating on induced draught; and this subject opens up a very wide field for the Bonecourt type of boiler. The general arrangement of the boiler, &c., is similar to that for gas firing, with the exception that no burners are required, and that the superheater is generally arranged on the inlet side of the boiler—not between the boiler and the feed-water heater. The discharge temperature of a gas-engine averages from 450° to 500° C.; and this exhaust contains some 40 p.ct. of the total heat energy supplied to the engine as gas. Bonecourt boilers, specially designed for dealing with gas-engine exhaust products, are giving excellent results. To afford an idea of the economies to be effected by this class of boiler, the author remarked that a 500 B.H.P. gas-engine, running 24 hours a day, six days a week, at 80 p.ct. full load, has its exhaust dealt with by a waste-heat boiler. This boiler gives 1100 lbs. of steam per hour from and at 212° Fahr., at 80 p.ct. full load, which is equivalent to the results obtainable by burning some 300 tons of coal per annum. With steam-boilers of the Bonecourt type working on gas-engine exhausts, steam is available at working pressure in about 30 min. from starting-up the gas-engine—showing the remarkable rapidity of heat transference in this class of steam-generator.

The hot gases discharged from industrial apparatus [which is the second of the two branches into which the waste-heat field may roughly speaking be divided] often contain over 70 p.ct. of the heat available from the fuel. The author quoted successful installations in connection with steel furnaces and other industrial operations, and went on to say that practically all the waste-heat boilers put in by the Bonecourt people have been either 100 p.ct. per annum investments—*i.e.*, the cost of the installation has been recovered on the saving in fuel in the first year—or else even better results have been obtained. One of the examples given to show what can be done in this field by the installation of suitably designed steam-generators, was in connection with regenerative gas-works retort-ovens, with regard to which the following figures were set out: Percentage of oxygen in the products, 11·7; nature of the fuel used, producer gas; temperature of the products of combustion leaving the plant, 410° C.; percentage of the net calorific value of the fuel normally lost in the products of combustion, with no waste-heat boiler installed, 42·7; thermal efficiency of the Bonecourt waste-heat boiler generating steam at 100 lbs. gauge pressure without economizer, 50·7 p.ct.; thermal efficiency of the Bonecourt waste-heat boiler generating steam at 20 lbs. gauge pressure without economizer, 61·2 p.ct. The paper was accompanied by a number of appendixes furnishing full details of tests on Bonecourt boilers in varying circumstances.

Concluding his communication, Major Gregson said he had several times been asked to quote actual comparative costs for steam-raising in big power plants by gas and by coal fuel. Take the case of a bye-product recovery coke-oven installation, where there is a surplus of gas over and above that required for power purposes in the installation itself. Suppose this surplus gas be sold to the local municipal electrical authorities (or to any other body who wish to generate electricity) at 9d. per 1000 c.ft., then, if the gas be burnt in Bonecourt units, complete with economizers, the gas fuel will be equivalent for steam-raising purposes to coal of 12,000 B.Th.U. per pound at 33s. per ton burnt in water-tube boilers with economizers; in each case approximately 625 lbs. of steam from and at 212° Fahr. being available per 1s. of fuel cost. In some supplementary remarks, he drew attention to an actual

case where the choice lay between coke-oven gas at 1s. per 1000 c.ft., and coal of the price and quality named. Though the fuel cost itself was higher in the case of the Bonecourt boiler than in that of the Lancashire boiler, the saving on labour and on depreciation and interest, owing to lower capital cost in the case of the Bonecourt boiler installation, more than balanced the extra fuel cost.

LOW-TEMPERATURE CARBONIZATION AND ITS APPLICATION TO HIGH-OXYGEN COALS.

By S. W. PARR and T. E. LAYNG, of the University of Illinois.

[A Paper presented to the American Chemical Society.]

The low-temperature carbonization of coal is ordinarily understood to mean its destructive distillation at temperatures not in excess of 750° to 800° C.

COMPARISONS WITH HIGH-TEMPERATURE CARBONIZATION.

Certain features which accompany this particular condition may be briefly enumerated as follows: The demarkation of temperatures indicated by 750° to 800° C. is not arbitrarily chosen, but seems to be a natural dividing-line between the decomposition processes that liberate heavy products which are largely condensable and those reactions which deliver light or non-condensable compounds. Another method of stating the case would be to say that below 750° the volatile products are tars or oils and some fixed gases, while above 750° the volatile products are gases only.

Again, under low-temperature conditions, the volatile constituents are largely the initial products of decomposition, as set free by the various components of the coal, and in the main are not subject to any great modification by secondary processes of decomposition. By this, it is not intended to affirm that no secondary reactions occur. By their very nature, these volatile products are susceptible to change; but the changes are more in the nature of interactions or reactions among themselves or with the decomposing constituents, whereas, under high-temperature conditions, there proceeds a very positive breaking-down of these easily decomposible compounds. In other words, the high-temperature process accentuates the matter of secondary decomposition so that the ultimate products bear little relation to the character of the substances that first result from the destructive distillation of the coal. A bituminous coal, which under the ordinary high-temperature process yields 10 gallons per ton of condensable material, will, where these secondary decompositions are lacking, yield from 20 to 25 gallons per ton. Indeed, certain types of coal have been found where the condensable products are in excess of 30 gallons per ton.

CHARACTER OF LOW-TEMPERATURE PRODUCTS.

Other interesting features relate to the character of the compounds that are discharged under the low-temperature range. No information along this line can be gained from a study of high-temperature products, because their character has been quite altered or obscured by the secondary decomposition resulting from the passage of the initial volatile constituents over or through the highly-heated passage-ways or masses of coke. As a matter of fact, it is only by a study of the products as they are discharged at successive temperature stages that we can arrive at any safe conclusions as to the character of the initial products of decomposition. It will not be strange, therefore, if we have to modify to a considerable extent our present conception of the decomposition procedure.

Briefly stated, we shall find the order to be: Water, carbon dioxide, and methane, with respective temperature ranges of approximately 250° to 300°, 300° to 350°, and 350° to 400° C. At the last-named stage, there commences the discharge of ethane and heavier hydrocarbons, with the beginning also of condensable products in which the sulphur and oxygen compounds predominate. The latter show themselves in the form of tar acids. The chief feature concerning the sulphur is that the part which is in organic combination in the coal is quickly discharged. A range of temperature, however, seems to be attained where there is substantially no sulphur decomposition, as shown by an almost total absence of this constituent in the gases. However, at higher temperatures, where decomposition of the iron pyrites occurs, the volatile sulphur compounds appear, largely in combination with the tar or oil constituents.

This substantial absence of secondary decomposition accounts for a number of characteristic variations in the bye-products. For example, the tars are thin and light, having a consistency much more resembling oils. They have a specific gravity so nearly approaching unity that the separation of water from the oil is difficult. The tars contain practically no free carbon. The gas yield per pound is less, being from 60 to 80 p.ct. of the volume obtained by high-temperature processes; and both gas and tar are free from naphthalene.

These differences are such as one would naturally expect as a result of the presence or absence of secondary decompositions. The argument in favour of the tars is that, in addition to their much higher yield, it would be better to carry out the possible decompositions on them as a distinct process, under exact control, and for the production of specific substances, rather than submit them to the more or less uncertain and haphazard reactions which result from the high-temperature decompositions.

Another method of stating the important feature of oil or tar yield is from the viewpoint of our rapidly vanishing petroleum supplies. If, for example, a Scotch shale, with a yield of 20 or 25 gallons of oil per ton and no bye-products of value, is a workable proposition, why may we not look with favour upon a bituminous coal having a potential yield of 20 or 30 gallons of liquid fuel per ton and a bye-product in the way of a smokeless solid fuel of even greater value than the oil?

COKING HIGH-OXYGEN COALS.

Since most of our high-volatile coals are, as a matter of fact, also high-oxygen coals, the question at once arises as to the possibility of producing a marketable coke from high-oxygen coals. Concerning the coking of such coals, we shall doubtless be obliged to recast to a certain extent our theories as to the chemistry of coal carbonization. In a general way, it has been held that a coal with an oxygen content above a certain amount—for example, an oxygen-hydrogen ratio much in excess of 50 to 50, or (say) 6 p.ct. of oxygen to 5 p.ct. of hydrogen—should be classed as a non-coking coal.

Now the fact that a low oxygen content is characteristic of the coals which make good coke by methods now in use, may be a coincidence, and not a cause. At least, there has never been any very good explanation of why a high oxygen content should result in poor coke. We are positive in this connection of only one thing—namely, that we have found no explanation which we can guarantee as satisfactory in all cases, or in all respects. But experiments have proceeded to a point where a few fundamental propositions are seemingly established. For example, that part of the coal which is "phenol-soluble" has a definite melting-point; and this material in its final decomposition furnishes the binder for the production of coke. It is largely composed, however, of highly unsaturated compounds; and these, if allowed to come in contact with certain decomposition products of the fully oxygenated type, unite with them to form compounds having totally different characteristics, chief among which is the absence of any melting-point, and consequently the absence of the coking property.

Let us go a step further in this illustration. A coal which is finely divided, and which has been exposed to the air for some time, will have lost its coking property, even though the coal be of the so-called coking type. Now, if our reasoning is correct, such a coal might be so handled in the coking process as to eliminate those oxygen compounds in such a manner as to avoid the disastrous reactions with the active coking constituents. Experimental evidence is in hand showing this can be done. The same reasoning, of course, will and does hold true for the coals with a high normal oxygen content. They may be dealt with in such a manner as to produce a very weak and indifferent coke, as seen in the ordinary gas-house product; or, under other conditions where deleterious interactions are avoided, a coke of altogether different texture and density may be the result.

Further, these considerations are not inconsistent with the theories now being developed by Dr. Thiessen as to the composition of coal. He seems to show that the phenol-soluble portion is the degradation product, through geological processes, of cellulosic material; and not, as Lewes would have us believe, of resinic bodies. From this standpoint we should say, then, that this material, which constitutes the true coking substance, has a marked tendency towards a reversion of type. This may show itself either in the interaction which occurs during destructive distillation, or still more readily in the effect of weathering. A striking illustration of the effect of weathering is occasionally found in the case of Illinois coals, where the outcrop shows a marked reversion of type, to the extent that it has every characteristic of a lignite; whereas the coal from the working face completely removed from weathering effects, shows no such reversion.

TEMPERATURE CONTROL.

Thus far this discussion has dealt only with some of the theories underlying the carbonization of high-oxygen coals. The methods which suggest themselves for securing the conditions indicated involve a procedure whereby the changes may be brought about in stages, or what may fairly well be designated as fractional decompositions. Such a method implies an observance of temperature control quite unknown and quite impossible under the ordinary high-temperature conditions. This matter of temperature control involves the entire question of successfully carrying out any sort of a low-temperature programme. Indeed, it is of such paramount importance, and in all of its bearings upon the situation involves so many factors, that its proper discussion should be reserved for separate consideration. However, brief reference to it is made here for the purpose of indicating that the preceding discussion is not purely academic and theoretical, with no hope of possible attainment in practice, but, as a matter of fact, may be found the most logical procedure, even under industrial conditions.

The first question we meet is this: Can we carry heat to the centre of a non-conducting mass by conductivity methods alone, without doing violence to all ideas of temperature control? If we look to the modern bye-product oven for an answer, we shall be obliged at once to say, "No." In this practice, for the temperature at the centre of a coal mass of 18 in. cross-section to reach the beginning of the carbonization stage, requires at least fourteen out of the total of eighteen hours; and even this is

accomplished only by maintaining a surrounding temperature of 1000° C. as an impelling force against the non-conductivity conditions prevailing. Obviously, the low-temperature idea in any of its bearings is incompatible with such procedure.

A number of methods have been proposed for meeting this condition of non-conductivity without the use of excessive temperature. The most frequent is the application of temperatures within the prescribed limit to a mass of coal so narrow in its cross-section that the penetration of heat from the two sides would be sufficiently uniform and rapid to meet the requirements so far as ultimate temperature throughout the mass is concerned. The same idea is involved in any briquetting process with subsequent application of heat to the briquettes; the factor involved being the cross-section of the individual briquette masses.

In the process as we have developed it, utilization has been made of the ability of coal under the proper conditions to supply its own heat, which may thus be made to proceed autogenously throughout the mass without reference to its size or cross-section, and without the application of any external heat in excess of the prescribed maximum for the theoretical conditions involved in the low-temperature idea. Fortunately, these reactions, which are responsible for what is well recognized as the exothermic behaviour of coal in the process of carbonization, occur well within the prescribed limits. As a matter of fact, they are most in evidence at temperatures of approximately 300° to 400° C. Up to date, our experiments have not involved cross sections of coal greater than 16 in.

Character of Coke Obtained.

The appearance of the material produced under these conditions is strikingly characteristic. It is uniform in texture, without any zoning evidence of progressive stages in heat transmission, dense, and of good strength, and without any of the fingering effect characteristic of the high-temperature method. The volatile matter retained under these conditions may vary from 5 to 15 p.ct., depending upon the coal and the ultimate temperature attained. It contains no condensable hydrocarbons, and if discharged by the application of further heat would appear almost entirely as hydrogen and methane. As would very naturally be expected where an autogenous generation of heat is involved, the time element for bringing about the carbonization is greatly reduced; the average time being from three to four hours. Experiments involving the exact measurement of the amount of heat available from different coals, the conditions of its greatest development, and the limits as to mass wherein it may be made practically operative, are still matters of experimental research.

Life and Capacity of Conveyor Belts.

In the course of a paper read before the Institution of Mechanical Engineers, describing plants installed for the mechanical loading and unloading of ships, Mr. H. J. Smith, of Shanghai, made some remarks upon the life and capacity of belts when used as conveyors. He pointed out, in the first place, that for moving minerals along the level or on an inclination not exceeding 20° above or below the horizontal, the belt-conveyor transcends all its rivals, both for simplicity of construction and economy of first cost. The durability of the moving parts of a belt-conveyor is greater than is generally supposed—in proof of which he cited the fact that a belt 30 in. wide, made-up of eight plies of cotton-duck, faced and filled with rubber, is known to have elevated 2 million tons of coal, while working at a speed of 460 ft. per minute, at a South African colliery. Makers should, he said, be willing to guarantee the life of a 48-in. belt at not less than 1 million tons of coal carried, if allowed to supervise the erection of the plant. There are several types of belting suitable for conveyors; and for each of them there is claimed some superiority. The choice of a belt for this class of work depends, however, upon several considerations. If the conveyor has to work in the open air, or carry wet material or stuff containing destructive acids, then Mr. Smith regards it as a waste of time to argue against a rubber-covered belt. If an engineer is in doubt which is the best class of belt material for his particular purpose, the matter is easily settled, because belting will work quite well on a conveyor if joined-up in two or more pieces by "Bristol" lacing. This test is conclusive, as the sections can be watched while working under exactly the same conditions. Generally speaking, a low-priced belt is false economy; and it is worth noting that the most expensive brands retain their market. The best results cannot be expected from any make of belt unless the structure and mechanical portions of the belt are designed to comply with certain conditions favourable to the belt; and the author furnished particulars to enable engineers to specify the principal portions of the conveyor in some detail when ordering appliances of this class. As to the best speed for belt-conveyors, he is in favour of from 300 ft. per minute for smaller sizes, up to 500 ft. for the larger ones.

In a circular just issued, the Chemical and Dyestuff Traders' Association state that considerable uncertainity exists as to the chemicals and dyestuffs covered by the Dyestuffs Act, and that a complete list is in preparation. Chemicals excluded from the present Act may be included in the new Key Industries Bill, which is to be introduced early next session, and which is intended to secure protection, over a limited period, for the organic chemical industry and the scientific glassware industry.

A COMPRESSOR FOR SERVICE CLEANSING.

A service cleanser which, owing to its great power, should prove effective under any conditions that are likely to arise in connection with a gas-supply pipe, is patented and marketed by Messrs. William Turner and Co., of Eyre Lane, Sheffield. This powerful action is derived from a combination of two patents—one relating to an air-compressor, and the other to an instantaneous outlet-valve.

The Turner quadruple air-compressor, or pump, is fitted inside a container 9 in. by 4 in., and will, on account of its compound construction, quickly and with ease fill the container with air to a high pressure. The air in the pump is gradually compressed from one cylinder to another, and finally delivered into the container from a small or high-pressure cylinder. The second patent relates to a cock or valve which is so constructed that it may be instantaneously opened to its full extent. The inlet of the cock is connected to the container; and on the outlet is a flexible tube made to communicate with the pipe to be cleared. When the valve is opened, by a simple movement of a trigger, the contents of the container pass instantly at the maximum velocity into the pipe to be cleared.

The cleanser is fitted with hand and shoulder carrying straps, pressure-gauge, rubber plug, special adaptor, &c.; and if desired, it can be had, for special purposes, in a considerably larger size than that mentioned, which is ample for all ordinary uses.

STEAMING RESULTS AT OTTAWA.

In the course of a paper which he read at the last meeting of the Canadian Gas Association, Mr. F. Elcock, the Superintendent of Works to the Ottawa Gas Company, gave an account of the results of steaming in Glover-West vertical retorts.

Upon the completion of the Ottawa installation, he commenced light steaming; and the plant has never run without, except during repairs to steam-lines. The retorts now, after three years' work, are in fine condition in the bottom sections. The upper sections—the most easily got at—are the first to show signs of wear and tear. From estimates made with light-steaming, he found that it accounted for about 1700 c.ft. per ton of coal carbonized, when making gas of 535 B.Th.U.; but with heavier steaming and gas of 465 B.Th.U. gross, there is an increase up to 6500 c.ft. per ton.

Results were submitted of tests which were in the first place intended merely for comparative purposes, and not for publication. They were made soon after the new calorific value standard was authorized. At that time, the plant was not tuned-up to the new conditions; and some changes have been found beneficial. The tests were run off for the following information:
No. 1—Results when operating on a gas of about 460 B.Th.U.
No. 2—Results when operating on a gas of about 490 B.Th.U.
No. 3—Results when operating on a gas of about 520 B.Th.U.
No. 4—The results of No. 1 were so high that No. 4 was run off to check it.

Results of Tests.

—	No. 1.	No. 2.	No. 3.	No. 4.
Total gas made in c.ft. . . .	2,213,120	2,207,712	2,304,612	3,422,170
Gas made per ton of 2000 lbs., c.ft.	17,520	14,616	11,758	17,919
Gas per retort, in c.ft. . . .	34,580	34,495	37,780	35,647
Coal carbonized, tons . . .	126·32	151·04	196	190·97
Coal carbonized per retort, tons	1·97	2·36	3·213	1·989
Calorific value gross B Th.U.	467	487	521·5	457
Multiple	8,181,840	7,117,992	6,131,797	8,188,983

Heavy steaming accounts for an increased efficiency of about 9 p.ct. on the total B.Th.U. obtained per ton of coal carbonized. The make per ton increased by about 7000 c.ft.; ammonia 1·15 lbs.; tar 1¼ gallons. The coke made dropped about 8 p.ct., and fuel increased by about 7 p.ct. The author was unable to give any figures as to steam consumption and boiler fuel; but the steam is generated very cheaply by screenings from coke which can only be sold at a low rate. The steam is admitted continuously through a $\frac{3}{16}$ in. nozzle in the bottom coke-chamber. With heavy steaming, a pressure of 25 lbs. per sq. inch is utilized, and with light steaming 15 lbs. per sq. inch, at the retort.

With reference to the make of gas per retort, this was lower during the heavy steaming tests; but since these tests were made more experience has been gained, and there is now being produced about 3000 c.ft. per retort per day more than was done with the light steaming, of 540 B.Th.U. gas. During the tests, moderate carbonizing temperatures were employed; the average being only about 2000° Fahr.

Carbonizing under Various Conditions.

Below is an approximate statement of results obtained when carbonizing under various conditions. It is plain to see the increased efficiency obtained. It will be noticed that, with steaming in verticals, there is an increased efficiency of 9 p.ct. over

horizontal retort carbonization, making 550 B.Th.U. gas. The efficiencies are based upon coal containing 27 million B.Th.U. per ton.

—	Make Per Ton.	Calorific Value.	Multiple Thousands.	Efficiency. P.Ct.
Made in horizontal retorts	10,500	550	5775	21·40
Made in vertical retorts—				
(light steam) . . .	12,250	540	6615	24·50
(heavier steam) . .	17,500	465	8137	30·14

AMMONIA COLUMN STILLS.

In an article dealing with the use of ammonia column stills in connection with bye-product coke-ovens, Mr. A. THAU, of Oxelösund, Sweden, in the "Journal of Chemical and Metallurgical Engineering," says that the Savalle column, the principle of which has been retained completely in subsequent design, consists of a number of circular or rectangular sections, flanged together. While the liquid to be distilled is being introduced into the top section of the column, steam enters countercurrent at the lowest section near the bottom of the still. The steam is distributed through a number of round holes or rectangular slots, the edges of which project about 2 in. above the bottom plates. These steam passages are covered a short distance above the projecting edges by hood-shaped baffles, which project downwards, close to the bottom or tray. They are provided with small teeth, so as to distribute the steam evenly in a fine spray through the liquid which collects on the tray of each section. Tubular or rectangular overflows are provided for each section. Their upper edges do not project quite as high as those of the steam-passages. They go down into the next lower section, so that the ends are sealed in the liquid collected on the bottom. Baffle-strips are arranged on each bottom between the baffles, in order to compel the liquid to flow over each tray and all round the baffles.

The steam expands and fills the section completely, thereby directly heating the lower layer of the liquid, and indirectly the liquid in the section above. The transmission of heat through a cast-iron plate of about ½ in. in thickness is much slower than by direct contact. Vapours of products with a lower boiling-point are volatilized, and mix with the steam. In the bottom section, where the liquid should contain only traces of products, this admixture is naturally relatively small; but it increases from section to section upward, while an amount of steam, proportional to the amount of vapours taken up, condenses. This action is of minor importance compared with the effect resulting from the steam being forced in fine streams from under the baffle-edges through the liquid, with which it is thus brought into very intimate contact. The transmission of heat from the steam to the liquid is thereby greatly increased, and the admixture of light vapours becomes much greater.

The column-still can, of course, be used as a washer; and some of the first gas-washers ever built were constructed on the very same principle. The gas takes the place of the steam; and the washing liquid is fed the same way as for distilling. The only difference from distilling rests with the fact that a chemical or mechanical absorbing effect is obtained without the aid of heat. Ammonia, benzene, cyanogen, and naphthalene washers of this type are still used. Though they were formerly built of very large diameters, with large gas-passages and baffle openings, they are now rarely applied as washers owing to the great amount of back-pressure they cause, which impairs their efficiency.

In the construction of the column-still, two different tendencies are prominent. Many constructors disregard the indirect action of the steam, and provide as many passages, baffles, and overflows as can be crowded into the column. Others try to make full use of the indirect heating by the steam, and arrange only one steam-passage, baffle, and overflow to each section; so that large layers of liquid are collected in each, offering a big surface to the steam above and underneath. In the former types, provision is made to enforce a rapid circulation of the liquid. In the latter designs, the liquid is to remain in each as long as possible, and flow slowly—in proportion to its feed—in an ordinary zigzag way down the still sections. These latter stills, extensively used in England, and less in number on the European Continent, form the minority in use. Thus far the action of a fractionating still is the same, whether used for the distillation of ammonia or benzene. It will now be necessary to treat the ammonia still separately.

The stills consist, according to the work they have to perform, of three parts—viz., one to drive off the free ammonia, one to liberate the ammonia by substitution of a stronger base in the salts, and one to treat the liquor holding the liberated ammonia in solution. These three parts are usually united in two columns, and at times in one. The fixed ammonia amounts to about one-third; but the part of the equipment in which it is distilled is generally the same size, owing to the bulk of water handled.

The upper part of the column into which the ammonia liquor is fed must be large enough to give the capacity needed to drive-off all those compounds which are liberated by the application of heat—mainly ammonia, carbon dioxide, and hydrogen sulphide. The liquid leaving this part of the still should contain only traces of free ammonia, and no carbon dioxide. The sulphur compounds can be disregarded. Carbon dioxide, which is always present in crude ammonia liquor, is too often neglected; and the detrimental part that it plays in the operation has escaped proper attention. Though easily volatilized between 90° and 100° C., it condenses, thus going into solution again with the ammonia liquor in the still. Pressure in the still has an impeding influence upon the liberation of carbonic acid by heat.

While the principles of a column-still have been sufficiently described in general, there remains to be mentioned the so-called dephlegmating—a cooling action, which continually takes place on the inner walls of the sections above the liquid levels. As the steam introduced at the bottom is the only source of heat, it follows that the bottom is the hottest part of the still; and by the loss of heat through radiation, as well as by the introduction of the liquor at the top, the temperature gradually decreases. This dephlegmating action is important in stills built for direct action, inasmuch as a large portion of the steam is condensed. The vapours are more saturated with ammonia the higher the column is relative to the heat added by the steam. In those stills in which the indirect distilling actions are more pronounced than in the direct ones, the vapours are altogether richer in ammonia. In order to retain the indirect heat as much as possible, it is often desirable to counteract dephlegmation, by which the efficiency in this case is impaired. Such stills are covered with a magnesia-asbestos cover.

To liberate the fixed ammonia, the liquor leaving the top portion of the still enters a mixing chamber into which milk of lime is introduced. The lime does not react with the free ammonia; but it replaces the ammonia in its salts, and liberates it. If the liquor contains carbon dioxide, it enters into combination with the lime, forming carbonate of lime, which sets stone-hard in the still, and makes frequent cleaning of the still necessary. For this reason, it is advisable to have the liquor free of carbonic acid. The most certain way to avoid the formation of a stony precipitate is to decarbonate the liquor before it enters the still. One method is to provide a preheater of any effective type, as a heat exchanger warms the incoming liquor by the outflowing of the waste liquor to a temperature over 90° C. If from lack of efficiency this is not attained, a steam-coil must be added. A pipe from the top of the heater is connected direct to the ammonia gas main of the still, through which the liberated CO_2 is permitted to escape without entering the still. This pipe must be erected higher than the liquor feed-pipe of the still, and a feed valve for the liquor be arranged on the heater inlet; otherwise the ammonia liquor from the heater would be introduced into the ammonia steam-pipe.

The milk of lime fed into the still should be kept at a constant strength, generally 10° to 15° Bé. (15° to 23° Twaddel, 1·07 to 1·1 specific gravity). It must be free from large pieces, which are not easily suspended in water. The lime should be slaked, and the solid parts which do not pass a fine sieve removed. It is then stored in a receptacle, where the water can drain off gradually, to thicken. After that it is washed through a very fine sieve into the stirring-tank, from which it is pumped to the still. An ammonia distilling column can, with the above precautions, be kept going for years without being dismantled. If the efficiency decreases, the hand-hole lids of those portions of the still in which the limed ammonia liquor is treated are removed, and the internal parts cleaned by flushing with water at fairly high pressure by means of a hose and nozzle. In a well-designed ammonia still, baffle-hoods and overflow passages must be proportioned in size so that these removable parts can be taken out through hand-holes for cleaning, inspecting, or replacing.

The lime-mixing chamber of the still must be provided with a drain-cock of sufficient diameter to drain any lime sediments formed between shifts. A funnel-shaped mixing chamber bottom with a drain-cock in the middle has been found most suitable for keeping the lime chamber permanently clean. To compensate for the lowering in temperature by the introduction of the milk of lime, a small steam-pipe is brought into the lime-mixing chamber immediately above the bottom; and the required amount of steam to supply the heat needed is allowed to enter. The steam-pipe is arranged inside the lime chamber as a perforated coil to obtain sufficient agitation to prevent the lime from settling out. The end of the lime feed-pipe is advantageously connected to the pipe through which the ammonia liquor enters the mixing chamber from the section above it—thus preventing the dip-pipe getting obstructed, and at the same time ensuring thorough mixing of liquor and lime.

We have received a pamphlet copy of "Abstracts of Papers relating to Gas Manufacture," by Mr. A. V. Hendrickson. The subject-matter, which is dealt with in the manner familiar to readers of the "Gas Chemists' Summary," is sufficiently indicated by the title. Copies of the brochure, which is a reprint from the 1920 volume of "Transactions of the Institution of Gas Engineers," may be obtained from the compiler; price 2s. 6d.

A method suggested in Germany of converting ordinary bricks into very refractory firebricks is to coat them with a mixture of 75 p.ct. of carborundum and 25 p.ct. of sodium silicate. The mixture is applied to the thoroughly dried bricks; and the coating is dried 24 hours before being slowly heated and burned-in. The coating has been successfully used for the inside of gas-retorts, as well as the outside; and a paste of 50 p.ct. of carborundum and 50 p.ct. of clay serves for repairs whenever cracks appear.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Neutralizing and Drying Sulphate of Ammonia.

SIR,—Our attention having been called to a notice under the above heading in your current issue, we beg leave to state, with reference to the amendment of the specification to patent No. 141,798 (South Metropolitan Gas Company and others) that:

1.—The amendment was made to distinguish clearly between two inventions.

2.—No settlement of any questionas to priority of patent rights was involved.

We may add that section 8 of the Patents and Designs Acts, 1907 and 1919, relates to procedure between the Comptroller and the applicant or patentee which is confidential in character, and in which no third person can take a part.

ABEL AND IMRAY,
Chartered Patent Agents.

30, *Southampton Buildings, W.C.*,
Jan. 31, 1921.

Works Joint Committees.

SIR,—In case it may be of interest to your readers, I enclose particulars and rules of a Works Joint Committee which has been founded by my Directors, after negotiations with a representative Committee of the workmen, on the lines laid down by the Regional Council for the District.

SECRETARY.

January 1921.

[Apart from the provisions contained in the model drawn up by the Executive Committee of the National Joint Industrial Council for the Gas Industry, which was reproduced on p. 632 of the "JOURNAL" for Dec. 15, it is interesting to note the following rules laid down with regard to the constitution of the Committee.—Ed. "G.J."]

MEMBERSHIP, APPOINTMENT, AND ELECTION.

The Committee shall consist of ten representatives of the workers, and ten representatives of the management (appointed by the Directors) as follows: Three Directors, the Engineer and Works Manager, the Distributing Engineer and Sales Manager, the Secretary and Accountant, and four employees of the Company.

The representatives of the workers shall be elected from and by the workers in the following departments:

Manufacturing Department—	
Carbonizing department	2
Mechanical department	1
Yard department	2
Distribution Department—	
Head office	2
Branch office A	1
Branch office B	1
Branch office C	1

Election of the workpeople's representatives shall be by ballot, there being two scrutineers, one appointed by the management representatives, and one by the workpeople's representatives on the Committee.

A workpeople's representative shall not be less than 21 years of age, and shall have been continuously employed by the Company for at least twelve months.

Each candidate must be nominated by two workpeople of his department, who are themselves qualified to vote.

All employees who are not less than 21 years of age, and have been continuously employed by the Company for at least six months, shall be entitled to vote.

Nomination papers shall be received and ballot papers issued by the Company.

Gas-Furnaces.

SIR,—I beg a further indulgence in requesting the use of your columns to make a reply to Mr. Twigg's second communication on my paper to the Scottish Junior Gas Association (Western District), and to my previous letter appearing in your issue of Jan 5.

Mr. Twigg is under the impression that I have misunderstood some points in his first letter, and that I take exception to his making counter suggestions; but let me assure him this was furthest from my mind when I forwarded my last letter. If, however, Mr. Twigg would revert to his first letter, paragraph 3, and read these words, "I do not think that we should accept such classification," he must admit they are a direct repudiation of what I said, and not the forewords of a further suggestion as explained in his second letter. In any case, I have no fault to find with the opinions or suggestions of Mr. Twigg with regard to the classification of gas-furnaces, and, like him, would welcome a discussion on this particular subject, so that we might arrive at a definite class name for each system of heating. I say class name advisedly, because the technical terms, such as regenerative, semi-regenerative, recuperative, and non-regenerative, are confusing to those not conversant with the use of such terms. It has also to be admitted that the terms natural draught, air blast, fan blast, and induced draught are too varied in their application to indicate the type and use for which a furnace may be recommended.

As Mr. Twigg says, "There are furnaces—good, bad, and useless." And it is imperative in the interests of makers, users, and gas undertakings that, whatever terms are adopted, these will indicate to everyone interested the true efficiency value of the appliance in question. Such a proposition is not beyond a possible solution, and might be made a subject for discussion—either through the Technical Press or before some of our scientific societies.

With reference to my remarks on gas and air controllers, and Mr. Twigg's statements as to their being in some cases a greater bugbear than without them, that I am prepared to admit. No doubt he has tested a few, and found them wanting—due to the fact that they failed to take into account the question of variation in the quality of gas supplied. As Mr. Twigg is aware of my having produced such an appliance, I take this opportunity of informing him that such a factor was not overlooked by me; and I shall be delighted to demonstrate its possibilities when he can spare the time. I think it will also be agreed that to attempt to design such an appliance on automatic lines would produce an article too fragile and expensive, and that the cost would far exceed the advantage gained.

J. M'ISAAC.

Corporation Gas Department,
Milan Street, Glasgow, Jan. 29, 1921.

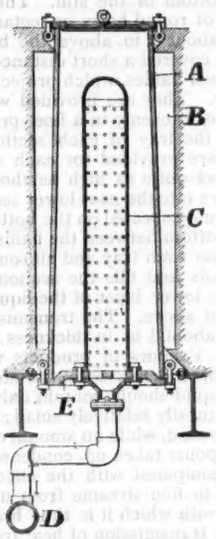
REGISTER OF PATENTS.

Distilling Carbonaceous Materials.—No. 129,997.

WALLACE, G. W., of Saint Louis, U.S.A.

No. 17,811; July 16, 1919. Convention date, March 26, 1918.

This invention relates to the distilling of carbonaceous materials heating from the exterior by a retort containing an inner perforated duct in which the gases, vapours, liquids, and oils evolved are drawn-off from the retort.



Wallace's Coal Distillation Plant.

In the apparatus shown, A is a circular retort or distilling chamber, preferably heated, for example, by products of combustion supplied to a combustion chamber B that surrounds the distilling chamber. A perforated take-off duct C within the chamber has its lower end connected with an eduction pipe D, located vertically beneath the take-off duct, and in which a suction or partial vacuum is created. As shown, the duct C and the bottom of the chamber A are adapted to be moved downwardly at the completion of the distilling operation, so as to discharge the residual coke from the distilling chamber and also withdraw the take-off duct from the chamber, in order to facilitate the cleaning of the take-off duct. Therefore the bottom plate of the chamber is removable. The take-off duct C is mounted on the bottom plate, and the lower end of the duct is connected with the eduction pipe D by a pipe that can be disconnected from the lower end of the duct and moved out of the path of the bottom plate when it is desired to move the plate downwardly. The shell that constitutes the side wall of the chamber A preferably tapers slightly from its lower towards its upper end; and its upper end is sealed from the atmosphere by a removable cover adapted to be opened to permit material to be introduced into the distilling chamber. The lower end is cut off from the atmosphere by the bottom plate, which is retained in position by bolts or other fastening devices.

The duct C is of a perforated cylindrical form that extends upwardly through the distilling chamber to a point in proximity to its upper end. It is preferably of uniform diameter throughout its entire length, so that the annular space between the exterior and the side wall of the distilling chamber will diminish gradually in cross-sectional area from its lower toward its upper end—thereby causing the heat to penetrate through the material in the distilling chamber substantially uniformly, owing to the fact that the thickness of the body of material in the lower portion of the chamber where the heat is most intense is greater than the thickness of the body of material in the upper portion where the temperature is lower. The take-off duct is provided with perforations preferably arranged uniformly throughout the major portion of its length, and of a size suitable for the particular carbonaceous material being distilled. It is closed at its upper end by a dome-shaped portion which is imperforate. It is essential that sufficient carbonaceous material be in the distilling chamber to cover the orifices in the take-off duct.

The apparatus now shown and described is similar to one shown in patent No. 129,996, dated July 16, 1919.

When heat is applied to the walls of the chamber A, all the gases and vapours evolved are forced or drawn into the duct C, travelling downwardly through the take-off duct to the eduction pipe D, and thence to a storage tank or the place where they are to be consumed. As the

take-off duct is preferably arranged at the centre of the distilling chamber at the coolest part of the body of carbonaceous material in the chamber, and as the take-off duct affords the only outlet, it will be evident that the gases and vapours, in escaping from the distilling chamber, pass through the coolest part of the material being distilled. In fact, says the patentee, from the moment the gases and vapours are evolved they follow a path in escaping from the distilling chamber A that will cause a reduction in their temperature below the initial temperature of formation—thus preventing any further breaking-down of the hydrocarbon molecules. The above is also true of the oils and other liquids evolved in the distilling operation; and, in view of the fact that the oils and liquids which enter the take-off duct C are collected in the duct and immediately removed from the apparatus through the suction pipe D, there is no possibility of the oils condensing, revaporizing, or becoming cracked or mixed with the coked material surrounding the take-off duct, as would occur if the oils were permitted to collect beneath or remain in the latter.

Upright Incandescent Gas-Burners.—No. 155,676.

DAVIES, H. L., of Handsworth, Birmingham.

No. 24,900; Oct. 11, 1919.

According to this invention, the crutch which supports the mantle is itself carried by a ring or member adapted to be detachably secured to, or positioned upon, the burner, so that, by lifting the ring from the burner by hand, the crutch and mantle can be removed so as to enable the gauze or other part of the burner to be cleaned or adjusted without fracturing the mantle. The device may be adapted for use in connection with burners as at present in use, or the burner may be especially fitted complete with the device.

Gas-Fires.—No. 155,710.

GABELL, J., of Wolverton.

No. 32,252; Dec. 23, 1919.

This invention relates to means by which the heat of the products of combustion of a gas-fire is utilized for heating a room, as well as heating water, before it escapes into the chimney.

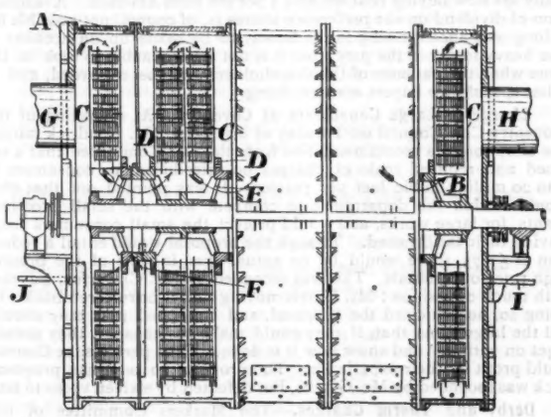
Arrangements with this object in view have been proposed, including some wherein the waste gases are made to flow at some point in a downward direction through the system before finally rising into the chimney—part of the system comprising pipes connected to form parallel paths. It is to means of this last-named kind that the present invention relates, and from which it is distinguished by the employment of tubular elements through which the gases travelling in parallel are disposed between a pair of superposed headers, the lowermost of which is above the level of the top of the fuel in the open gas-fire and to the rear thereof—the waste gases after leaving the upper header first descending before again rising into the chimney.

Gas Washer and Purifier.—No. 155,859.

COUNE, G., of Forest-lez-Bruxelles, Belgium.

No. 10,713; April 30, 1919.

This invention relates more particularly to apparatus for washing and purifying gases, or for treating them in order to extract bye-products—such as ammonia, naphthalene, cyanide, benzole, or the like—comprising a horizontal cylinder divided by transverse partitions into compartments partly filled with water or other absorbent liquid, in which to rotate washing wheels comprising sections of laminated material (such as wooden blades or discs) over which the gases pass.



Coune's Gas Washer and Purifier.

Each wheel has a hollow divided hub and comprises a double set of washing elements in each compartment mounted between discs, the medial disc of which divides the hub into two portions. The gases enter one washing element through the hub, and, after passing through the other element, find an exit also through the hub. The passage of the gases from one wheel to another successively is solely effected through the hollow hubs, and sheet-metal discs forming the transverse compartments of the apparatus are positioned between the hubs.

The illustration shows a washer constructed in accordance with the invention—part in vertical elevation and part in longitudinal section.

In the axis of the cylindrical body or fixed drum A, a shaft, mounted in exterior bearings, is rotated slowly; and upon it are fixed iron naves B supporting two sheet-iron plates, between which bundles of wooden blades are secured. The medial plate C extends from the periphery of the wheel to the nave itself; while the side plates extend from the periphery of the wheel to rings D secured to the nave by means of arms E, between which openings are left for the passage of the gas—hollow hubs being thereby formed, which are divided by the plates C into two portions. Fixed transverse partitions between the wheels are secured to the drum A and form joints with the naves of the washing wheels at F. The sheet-iron plates thus divide the drum into a set of compartments, in each of which is rotating one of the double washing wheels.

The end compartments may contain no wheel at all, in which case they are only ducts for the gas. But if one is provided (as shown), it is a single one.

The fixed drum is filled with liquid up to about the shaft, and the gas enters through the pipe G and comes out through the pipe H. It thus follows, in each double wheel, a path in two opposite directions—first from the centre to the periphery and then from the periphery towards the centre; while the washing liquid flows in the drum in a continuous way, and the circulation of the gas and that of the liquid are effected in opposite directions. When the liquid is circulated, it enters through the pipe I and issues through the pipe J.

The main advantages claimed for the apparatus are as follows: For an apparatus allowing of the passage of the same amount of gas and possessing the same washing efficiency, there is a diminution: (*a*) Of the number of joints similar to F; (*b*) of the wear and tear and of motive power; (*c*) of the number of separating plates and fixed partitions; (*d*) of the space required by the apparatus; (*e*) of the loss of charge in the circulation of the washing liquid (because of the diminution in the number of compartments and consequently of the number of decreases of the liquid level; (*f*) of the repairing and watching costs.

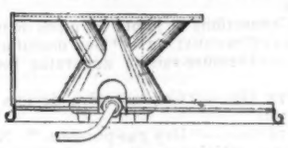
Gas Cooking-Stoves.—No. 155,879.

WAITE, G., Bexhill-on-Sea.

No. 21,358; Aug. 30, 1919.

This invention relates to a device to be placed on existing stoves to increase the amount of heat and enable cooking to be effected in less time than heretofore.

According to the invention, a cone or dome of metal is placed over the gas-ring so as to collect the heat from the gas-jets. The cone or dome is formed with one or more channels or tubes to convey the heat to a plate provided on the upper extremities of the tubes.



Waite's Gas Cooking-Stoves.

In one construction, the device consists of a metal cone (open at its base) riveted to a metal plate having an opening cut in it of a size equal to the base of the cone. At the apex there are provided four channels or tubes, each having a circular plate attached at its upper extremity and also an opening in each plate. This cone is placed over the gas-ring, and the heat given off by the jets is collected and caused to pass through the tubes to the cooking utensils placed on the plates. One form of the proposed arrangement is shown in the engraving.

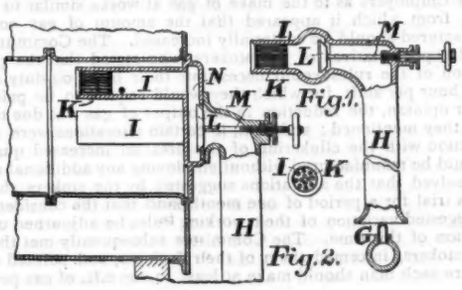
Bunsen Cooker Burners.—No. 156,050.

HELPS, G., Nuneaton.

No. 15,766; Oct. 13, 1919.

This invention relates to bunsen burners of the type in which the burner head is formed of a plurality of short fine tubes, with a passage immediately in rear of the burner head provided with a valve that can be adjusted by hand for the purpose of regulating the primary air.

The tubes of the burner head are not of greater length than about one or one-and-a-half times the internal diameter of the burner head, while each tube is fine with respect to the diameter so that a completely combustible mixture of gas and air can be burnt without firing-back.



Helps's Cooker and Boiler Burner.

Fig. 1 is a sectional elevation of the burner, with an end elevation of the head. Fig. 2 shows a group of the burner heads applied to heating a boiler.

Referring to fig. 1, G is a nipple injecting gas into a burner tube H whose head I consists of a number of tubes K. L is a valve mounted on a screw-threaded spindle M; the position of it being adjusted by screwing the spindle M in or out. The tubes and the valve both co-operate in the efficiency of the burner, which is capable of burning

without secondary air—an adjustment of the valve allowing the volume of primary air to be regulated, while the tubes allow the gaseous mixture to be burnt without firing-back.

Lighting and Extinguishing Gas-Lamps.

No. 155,888.

RADET, L., of Paris.

No. 22,802; Sept. 16, 1919.

This invention relates to the ignition and extinction of gas-lights at predetermined hours, admitting gas to the main burner for lighting-up by hand-operated mechanism whenever desired. The ignition is by contact with another flame.

The apparatus is characterized by the employment of a rotary distributor disc placed on the front of the distributing plate and operated from behind by the clockwork mechanism which opens and/or closes the main burner and the pilot jet respectively, combined with a device (when extinguished) which permits of effecting the ignition of the main jet by hand at any time—leaving the apparatus automatic in respect to the extinguishing of the light.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for Jan. 26.]

Nos. 2217 to 2917.

ANDERSON, J.—"Prepayment mechanism." Nos. 2421, 2422.
ANDREWS, C. E.—"Purification of naphthalene." No. 2554.
BAKER, A. E. S.—"Heating and operating gas-generators." No. 2632.
BARNES, W. T.—"Valves, cocks, taps, &c." No. 2450.
BERNSTEIN, A.—"Boxes for gas mantles." No. 2547.
BILBROUGH, C. F. S.—"Pipe-joints." No. 2367.
BROOKE, R. M.—"Furnaces for manufacture of producer-gas, &c." No. 2393.
CASSELL, W.—"Gas fires." No. 2513.
CHRISMAN, C. S.—"Gas apparatus valve or closure mechanism." No. 2839.
CONOVER, C.—See Andrews. No. 2554.
DAVIES, O. B.—"Apparatus for cooling, cleansing, or scrubbing gases." No. 2510.
FITTON, T.—"Connections or joints for pipes or tubes." No. 2243.
GENERAL OIL-GAS CORPORATION.—"Gas manufacture." No. 2580.
GILLIE, W. S.—"Pressure-raising apparatus for gas, &c." No. 2486.
HALBERGERHÜTTE GES.—"Control-valve devices for air and gas purifiers." No. 2311.
HALBERGERHÜTTE GES.—"Dry gas-purifiers." No. 2697.
HALL, J. GORDON.—"Valve-opening mechanism." No. 2395.
HELPS, G.—"Gas-cookers." No. 2344.
HELPS, G.—"Joints for main-pipes." No. 2712.
HUMPHREYS & GLASGOW, LTD.—See Chrisman. No. 2839.
JEFFREY MANUFACTURING COMPANY.—"Portable conveyors." No. 2446.
JENSEN, C. A.—See Jeffrey. No. 2446.
JOHN, K. B.—See Andrews. No. 2554.
MANIEL, V.—"Gas heating apparatus." No. 2577.
ODDY, T.—"Distillation of coal, peat, wood, &c., and retorts therefor." No. 2614.
OTTO, O. T.—"Treatment of tar oils, &c." No. 2297.
RUTH, C. E.—See Andrews. No. 2554.
STOKOE, E. L.—"Pressure and temperature indicating apparatus." No. 2231.
WHITWORTH, W.—See Brooke. No. 2393.

To Increase Production at Leigh (Essex).

The Gas Committee of the Southend Town Council report that they have considered a proposal that the stokers' working rules should be varied with a view to increasing the present make of gas. The manager laid before the Committee particulars of the quantities of gas made per man per shift in 1914 as compared with the present time, together with information which he had obtained from the Federation of Gas Employers as to the make of gas at works similar to those at Leigh, from which it appeared that the amount of gas now being manufactured should be materially increased. The Committee interviewed representatives of the stokers, who stated that the proposed variation of the rules would necessitate their being on duty an additional hour per shift, for which they would require to be paid; that, in their opinion, the reduction in the output of gas was due to causes which they mentioned; and that, if certain alterations were made in connection with the clinkering of the fires, an increased quantity of gas could be manufactured without employing any additional men. It was resolved that the alterations suggested by the stokers should be given a trial for a period of one month, and that the consideration of the suggested variation of their working rules be adjourned until the expiration of this time. The Committee subsequently met the whole of the stokers, informed them of their decision, and pointed out that in future each man should make at least 20,000 c.ft. of gas per shift.

Metropolitan Gas Company of Melbourne.—Messrs. John Terry & Co., of No. 7, Great Winchester Street, E.C., acting as agents, have received from the Metropolitan Gas Company of Melbourne a cable advice informing them that the Company's profits for the half year to Dec. 30 last were £39,363. A dividend of 6s. 6d. per share has been declared for the half year; and a balance of £25,001 has been carried forward. Dividends will be payable in Melbourne probably on Feb. 1; and drafts to absentee shareholders will be posted by an early mail thereafter.

LEGAL INTELLIGENCE.

Coal-Tar Pitch for Briquettes.

The Court of Appeal have lately dismissed an appeal by Messrs. Gatly, Saunt, and Co. from a judgment in favour of Messrs. Erlebach and Co. on a claim by the latter for some £1600 damages for breach of contract relating to the sale of coal-tar pitch. The plaintiffs' case was that some of the pitch submitted was not coal-tar pitch, and was not suitable for the purpose of making briquettes, for which to the defendants' knowledge it was required, and for which they gave all assurance it was suitable. Plaintiffs had resold the pitch to French buyers, who made complaints, and claimed on the plaintiffs. The defence was that the defendants did not know the plaintiffs were buying for resale for briquette making; they did not warrant the pitch as suitable for this purpose; and they did not admit that the pitch was not coal-tar pitch. Mr. Justice Bailhache, in the Court below, found that, having regard to the high percentage of ash contained in the pitch, it must have been blast-furnace pitch, which could not be commercially sold as coal-tar pitch, and was not good delivery under a contract which called for coal-tar pitch. Further, he came to the conclusion that the plaintiffs were told that the pitch was suitable for briquettes; and therefore under that head also they were entitled to judgment. Lord Justice Bankes, in giving judgment in the Court of Appeal, said he thought that, though the goods were not warranted as to quality, they were warranted as reasonably fit to make briquettes.

Damages for Loss of a Racehorse.

Sitting in the King's Bench Division of the High Court of Justice, Mr. Justice Coleridge on Monday decided an action in which Captain Renton claimed from the Wandsworth, Wimbledon, and Epsom District Gas Company £1000 damages for the loss of a racehorse through the negligence of the driver of a steam lorry belonging to the Company. When the accident occurred, the horse was being ridden on the road from Epsom to Ewell. After hearing a great deal of evidence, his Lordship found that there was negligence on the part of the defendants' driver, and no contributory negligence on the part of the man who was in charge of the horse at the time; and he assessed damages for the loss of the horse at £160.

Gas-Meter Theft.

At the Doncaster West Riding Police Court, last Thursday, Vivian Belfield was charged with stealing 18s. 1d. from a gas-meter at Denaby. Superintendent Minty explained that the prisoner went to the house of a Mrs. Evans, where he stayed the night. In the morning he disappeared; and it was then found that the prepayment gas-meter had been broken into, and the money taken. Prisoner went to Rotherham and gave himself up. It was stated that 14s. 11½d. of the missing money had been recovered. Prisoner was bound over to be of good behaviour for six months.

Primitiva Gas Company of Buenos Ayres.—The following City Note with regard to the prospects of the Company appeared in the "Evening Standard" a few days ago: Speculative investors who look well ahead are turning their attention to the preference shares of the Primitiva Gas Company of Buenos Ayres, now quoted at 37s. for the £5, with arrears of dividend amounting to 25s. The Company fell into default, owing to the impossibility of complying with their lighting contracts—coal being unobtainable at times under £12 per ton, and only small supplies at that. The old contract has been cancelled, and another of a more reasonable character entered into; and the Company are now buying coal under £3 per ton from America. A resumption of dividend on the preference shares is, of course, not possible for a long way ahead, owing to the leeway to be made up on account of the heavy losses in the past; but it is not unreasonable to look to the time when the patience of the shareholders will be rewarded, and is what speculative buyers are now doing.

Charge to Large Consumers at Coventry.—At a meeting of the Coventry City Council on Tuesday of last week, Mr. Kendrick moved the adoption of a recommendation from the Gas Committee that a revised and reduced scale of charges be introduced for consumers of 3 to 20 million cubic feet per quarter. It was pointed out that this would enable the department to compete with the small producer plants, for large works, and would protect the small consumers from having their tariff raised. Though the proposal would entail a reduction of £7875, there would be no actual loss, in view of the present high price of residuals. This was seconded by Mr. Cleverley, but met with much opposition; Mr. Harris moving that it be referred back. In doing so, he criticized the proposal, and suggested that they should tell the large firms that, if they could make gas cheaper, they should "get on with it," and show how it is done. Then perhaps the Council could profit by their experience. The proposal to refer the proposal back was seconded by Mr. Givens, but defeated by sixteen votes to ten.

Derby and Therm Charges.—The Markets Committee of the Derby Corporation report that the Derby Gas Company, desiring to base their charges upon therms instead of cubic feet, they (the Committee) recommend that no objection be made to the application, subject to the Company agreeing that 1d. for every 5 therms shall be substituted for 1d. for every 1000 c.ft. in the sliding-scale provided for by the Derby Gas Act, 1903, and that the neutral zone subject to which the standard rate is not diminished shall be 6d. per therm, not only in the case of gas supplied within the borough, but in the remainder of the limits of supply also. The Town Clerk reported upon interviews with the Solicitor and Engineer to the Company, and said Mr. Ferguson Bell was willing to recommend his Directors to agree to the proposals of the Committee, subject to 1s. 8d. p.ct. being substituted for 1s. 3d. p.ct. in the sliding-scale. The Committee decided that the Chairman and the Town Clerk should consult Mr. J. Bond, the expert for the Corporation, with respect to the matter, and that the Board of Trade be informed of the proposal of the Committee.

MISCELLANEOUS NEWS.

LONDON COUNTY COUNCIL AND GAS CHARGES.

The following questions were, at the meeting of the London County Council on Tuesday of last week, put by Mr. W. C. Johnson to the Chairman of the Public Control Committee:

1.—Whether the attention of the Committee has been called to the sudden increase of 10d. per 1000 c.ft. in the price of gas just announced by the Gas Light and Coke Company?

2.—What would the effect of this increase have been on the Company's dividend under the old sliding-scale?

3.—What will be such effect now the scale is abolished?

4.—What is the price charged by the other two large London Companies?

5.—Have not the Gas Light and Coke Company for many years supplied gas of the poorest quality at the highest price in London?

6.—What steps will the Committee advise the Council to take to protect the interests of the consumers in the matter?

7.—Can any approximate estimate be formed as to the extra expenditure incurred by local authorities for public lighting, as apart from the increased cost to individual consumers?

Below are the replies given by Sir George Bettesworth Piggott, K.B.E., J.P. (the Chairman of the Public Control Committee).

1.—The attention of the Committee will be directed to the subject at their meeting on Feb. 4.

2.—Under the old sliding-scale, with the price of gas at 5s. 6d. per 1000 c.ft., the authorized dividend would be 5s. 4d. p.ct. per annum.

3.—The suspension of the old sliding-scale is limited to gas at a price not exceeding 4s. 8d. per 1000 c.ft.; and in the new conditions the operation of the old sliding-scale would appear to be restored, unless and until the Board of Trade issue an Order under the Gas Regulation Act, 1920. The Company have applied for such an Order.

4.—The Commercial Gas Company, 4s. 8d. per 1000 c.ft. The South Metropolitan Gas Company, 10½d. per thermal unit, or approximately 5s. per 1000 c.ft.

5.—The Council's annual figures for 1915 and subsequent years show that, of the three large Metropolitan Gas Companies, the calorific value of gas supplied by the Gas Light and Coke Company is the least. It is the fact that the price charged by the Gas Light and Coke Company has usually been higher than that charged by the two other principal Gas Companies in London.

6.—The Company have recently made an application to the Board of Trade under the Gas Regulation Act, 1920, for the revision of the standard price of gas in the light of current cost of production; and the Public Control Committee have made representations to the Board of Trade in the matter.

7.—About £40,000 a year, if the charge for gas for public lamps is increased by 10d. per 1000 c.ft.

A report of the proceedings in the Council appeared in "The Times," and drew from Mr. F. M'Leod, the General Manager of the South Metropolitan Gas Company, the following letter, dated Jan. 26:

> Sir George Piggott, Chairman of the Public Control Committee, is reported to have stated at a meeting of the London County Council, when the subject of the sudden increase of 10d. per 1000 c.ft. announced by the Gas Light and Coke Company was under discussion, that gas was now supplied by the South Metropolitan Gas Company on a heat-unit basis at 10½d. per therm, or approximately 5s. per 1000 c.ft., as compared with 5s. 6d. per 1000 c.ft. charged by the first-named Company.
>
> The position is not accurately indicated by the figures quoted. In the first place, 10½d. per therm for gas as supplied by the South Metropolitan Company is equivalent to a charge of 4s. 9¾d. per 1600 c.ft. Further, to make a true comparison, cognizance must be taken of the higher heating and lighting value of this Company's gas; and if this be done, the difference would be shown to be nearer 1s. 6d. per 1000 c.ft. than 8¼d. In other words, a consumer using South Metropolitan gas obtains for 4s. 9¾d. what would cost him 6s. 3½d. in an adjoining area of supply.

BRENTFORD GAS COMPANY AND THE NEW BASIS.

Objection at Heston and Isleworth.

Regarding the application of the Brentford Gas Company for the substitution of the therm basis of charge for the present system, the Clerk to the Heston and Isleworth Urban District Council reports that, having regard to the calorific value of the gas now supplied by the Company, the application is, in effect, one for permission to substitute for the statutory standard price of 3s. 9d. per 1000 c.ft. the price of, roughly, 8s. 6d. per 1000 c.ft. He has accordingly lodged with the Board of Trade a formal objection to the proposed application; and the following is the gist of the representations which were submitted with the objection:

1.—That the present standard price is 3s. 9d. per 1000 c.ft., and that, as by the Brentford Gas Act, 1914, the prescribed standard calorific power of the gas is 540 B.Th.U., this price of 3s. 9d. per 1000 c.ft. is equivalent to 8·33d. per therm.

2.—That at the outbreak of war the Company were charging 2s. 4d. per 1000 c.ft. for gas of an estimated calorific value of 530 B.Th.U., and that the charge was then equivalent to 5·28d. per therm.

3.—That in 1919 the Board of Trade, upon the application of the Company, made an Order under the Statutory Undertakings (Temporary Increase of Charges) Act, 1918, fixing the price which the Company might charge to consumers at 4s. 10d. per 1000 c.ft., which was equivalent to 12·06d. per therm.

4.—That the present price is at the rate of 5s. 6d. per 1000 c.ft., which is equivalent to 14·34d. per therm.

5.—That in the near future it should be possible for the Company, without additional expenditure, to restore the gas to its pre-war calorific value; and that upon the assumption that they are able to do so, the correct standard price, according to the figures and on the basis submitted by them with their application, should be 16·49d. per therm, and not 1s. 7d. per therm—the former figure being arrived at in the following manner:

	Per 1000 C.Ft.	Per Therm.
Average cost of production for three years to 31/12/14	20·86d.	3·94d.
Estimated at present time	64·17	12·10
Showing an increased cost per therm of		8·16d.
Add to this the standard price mentioned in paragraph (1)		8·33
		16·49d.

6.—That the pre-war charge was 1·34d. per therm in excess of the cost of production then prevailing; and that, having regard to the probable growth in the consumption of gas, the standard price should not now be allowed to exceed the present cost of production by more than 1·34d. per therm, in which case the standard price would be 13·44d. per therm.

7.—That, in view of the unsettled conditions prevailing, the present time is most inopportune for the making of an Order revising the price of gas.

THE SUTTON AMALGAMATION SCHEME.

At the time of going to press with this issue of the "JOURNAL" news had not come to hand of the result of yesterday's adjourned meeting of the Sutton Gas Company, at which the proposed amalgamation with the Wandsworth Gas Company was to be further considered. A report of the proceedings will, however, appear next week.

VIEWS OF THE STOCKHOLDERS' COMMITTEE.

The Committee of Stockholders appointed at the meeting on Dec. 21 appointed Sir Stanley Johnson, M.P., Chairman; and Mr. Isaac Carr, M.Inst.C.E., of Widnes, was asked, as an independent engineer, to report on the condition and value of the works. Mr. Carr's report was prior to the adjourned meeting circulated by the Committee, with the remark that "its effect is to show clearly that the proposed amalgamation would be seriously adverse to the pecuniary interests of the stockholders, and, while largely benefiting the Wandsworth Company, would bring no corresponding or adequate advantage to the Sutton Company." The Committee went on to say that "the two points upon which the Directors of the Sutton Company appear to consider the transfer advisable are: (1) The probability of gas being supplied to Sutton at a lower price by the amalgamated Companies, with a consequent increase of dividend, owing to the greater facilities possessed by the Wandsworth Company; and (2) the serious capital expenditure that will be necessary if the Sutton Company continue to stand alone." On neither of these grounds did they think there was any reason to part with the undertaking.

In expressing their dissatisfaction with the manner in which this important business has been dealt with by the Board from its inception, the Committee suggested to the stockholders the paramount necessity of reconstituting the Board, and appointing to it at the earliest possible opportunity Directors possessing technical knowledge of the gas industry. They urged the stockholders to vote against the proposed amalgamation.

MR. ISAAC CARR'S REPORT.

Mr. Isaac Carr reported in detail the results of his investigation of the plant and buildings of the Company, summing-up in these words what he had to say on the subject: "From first to last, the whole of the manufacturing plant is in excellent working condition; and the works are complete with all necessary requisites. It is, in fact, one of the best-conditioned undertakings I have ever inspected." Having considered the working results, he expressed himself as strongly of opinion that no permanent advantage would accrue to the consumers of Sutton as a result of the amalgamation. On the contrary, he considered that, having regard to the comparative figures of costs of manufacture and distribution and capital expenditure, the best interests of the consumers of Sutton will be served by maintaining the undertaking as a separate unit. He gave the net cost of manufacture of gas into the holders at Wandsworth and Sutton as:

	1918.		1919.
Wandsworth	3s. 8·67d.	..	4s. 1·73d.
Sutton	3s. 7·84d.	..	4s. 1·85d.

Discussing the adequacy of the plant, Mr. Carr gave it as his opinion that there is no immediate need for capital expenditure upon the manufacturing plant, as the existing plant can with perfect safety be relied upon to turn out over 10 p.ct. more than the maximum demand for December last. The one pressing matter is the insufficiency of pressure at the two extremities of the district during certain periods of the day. His estimate of the capital expenditure to be incurred during the next two or three years is £20,000. The valuation arrived at by him for the undertaking is £312,534, or £910 per million cubic feet of gas. Should the Sutton Gas Company expend in the near future £8000 on the provision of water-gas plant [included in his £20,000 estimate of capital expenditure], thereby increasing the capacity of the works by 500,000 c.ft. per day, the capital expenditure per million cubic feet of gas sold would still be less than the Wandsworth Company's.

From the available comparative figures of the two undertakings, Mr. Carr is "strongly of opinion that no possible case can be made for their amalgamation, as this could not be entered into without considerable sacrifice on the part of the Sutton shareholders, both in the matter of probable future dividends and in the realizable value of their stock. Moreover, published statistics show that, as a rule, the costs of manu-

facture in the larger gas-works, both companies and municipalities, are substantially higher than those in medium-sized undertakings."

AN INVESTIGATION BY MR. WILLIAM CASH.

The Board are unanimous in their belief that the proposed amalgamation is in the best interests of the stockholders; but in view of the conflicting reports of Mr. Doig Gibb and Mr. Isaac Carr, they suggested that the meeting should be further adjourned, and that the whole question should be submitted for decision by an expert to be appointed by the President of the Institution of Gas Engineers or by the Board of Trade.

Meantime, they circulated copies of reports on the subject of the amalgamation by Mr. William Cash, who concluded, first, that the offer made by the Wandsworth Company is the best offer that can be expected from them; and, having regard to their financial position, it is a fair and reasonable offer. In fact, if the offer was to be improved, it might, in his opinion, evoke opposition from the local authorities in Wandsworth; and it may be that the offer, even as it stands, may meet with some opposition. On an approximate calculation, made without reference to the Wandsworth Company, the effect might be to raise the price of gas in Wandsworth by (say) 1d., and thereby reduce the dividend on the Wimbledon stock by 2s. 6d., to £6 7s. 6d. Taking this lower figure as a safe figure to assume, it is evident that the real question to decide is whether the Sutton Company can effect by themselves an equal or better reduction in the price of gas than would result from the amalgamation with Wandsworth. To get a like result, the price would have to be 2s. 3d. To get a better result, it would have to be a lower figure. Forming the best judgment he can, he is of opinion that such a position would be very difficult to attain, if not impossible.

After seeing a copy of Mr. Isaac Carr's report, Mr. William Cash submitted a supplemental report. Dealing with Mr. Carr's total valuation of £312,534, Mr. Cash said that, "deducting from this the debenture stock £26,825, there is left available for the shareholders £285,709, which on the issued stock of £133,571 gives a price of £214 per £100 stock. Surely it cannot be for one moment considered that Sutton stock can be worth anything like this price, either now or at any future date. To be worth £200, the dividend on the stock would have to be to-day (say) 14 p.ct. This has only to be considered to show how absurd the calculation is. Expressed in other words, to pay a dividend of £9 15s p.ct. would involve the necessity of selling gas free, or, to emphasize the point, to pay a dividend of £9 12s. 6d. gas would be sold at a 1d. per 1000 c.ft., on pre-war basis. It cannot be too strongly emphasized that the calculation must be made on pre-war basis, because any addition that is now granted to the Company to the old standard price would only cover the increased cost since the pre-war period, and therefore, while received on one side of the account, would be expended again on the increased expenditure. Whatever decision, therefore, the proprietors may come to, it is very important they should not be misled into the supposition that in any circumstances their undertaking can be worth anything like the capital figure which Mr. Carr brings out. It is obvious that Mr. Carr has entirely forgotten the fact that this is a sliding-scale company; and that even if such profits as he foreshadows could be earned, they would not be divisible."

GAS FOR THE BELLINGHAM HOUSING SCHEME.

Reference is made to-day in "Electricity Supply Memoranda" to the success of gas in connection with the Bellingham housing scheme of the London County Council. On the motion at last week's meeting of the Council for the adoption of a recommendation of the Housing Committee "that the houses at Bellingham be lighted by gas,"

Mrs. R. LAMARTINE YATES said she thought the Council should pause before they passed this recommendation, because "gas was a thing of the past." They had heard that day about the electricity schemes to cover the whole of London. Surely they were not, when they were urged on all sides to economize in expenditure, going to be a party "to the unhealthy lighting, the dirt which gas lighting meant—especially in these days when 8 ft. was considered sufficient for the height of a room." She did not think there had been anything more surprising in the Council's actions than to suggest that to-day houses should be lighted by gas, and not by electricity, for the sake of a few pounds. It was penny wise and pound foolish to think of putting gas into a house for any purpose—even for heating. But for lighting, it seemed to her an impossible thing.

On a division, there voted: For the recommendation, 74; against, 30. The motion was therefore carried.

GAS REGULATION ACT APPLICATIONS.

The following further notices have appeared in the "London Gazette" of applications by gas undertakings to the Board of Trade for Orders under the Gas Regulation Act.

Harrow and Stanmore Gas Company.

The standard prices now authorized in respect of the supply of gas by the undertakers are 4s. per 1000 c.ft. within a radius of one mile from the King's Head Hotel in Harrow, so much of the urban districts of Harrow and Wealdstone as lie outside that radius, and the urban district of Wembley, all of which parts are herein referred to as "the central area;" and for gas supplied outside the central area, a sum exceeding by 3d. per 1000 c.ft. the price from time to time charged within the central area.

It is also provided that the price chargeable by the undertakers for gas supplied by them, from time to time, for public street-lamps in any urban district within their limits of supply shall not exceed a sum

USE Simmance's

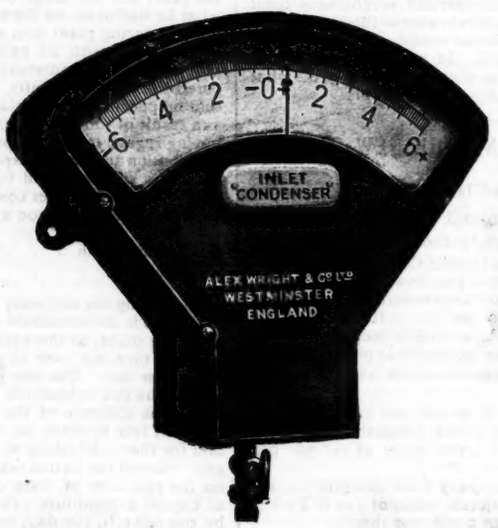
DEAD BEAT INDICATORS

instead of WATER-TUBE GAUGES and

"READ THE PRESSURE BY THE POINTER."

No liquid to evaporate and no levels to adjust.

No glasses to break and nothing to clean.



Direct reading, Open scale, Any range (Pressure, Vacuum, or Combination).

Incorrodible, Accurate, for foul or purified gas.

MADE IN MANY RANGES WITH TABLETS LETTERED AS DESIRED.

ALEXANDER WRIGHT & CO., LTD., WESTMINSTER.

Agents: Australia—FYVIE & STEWART, 360, Collins St., Melbourne; Canada—W. P. ROPER, 502, Merchants' Bank Building, Montreal.

which shall be 4d. per 1000 c.ft. less than the price per 1000 c.ft. from time to time, generally charged by them to private consumers residing within such urban district.

The prices which the undertakers have asked the Board of Trade to substitute for these are 1s. 6½d. per therm within the central area, and 1s. 7½d. per therm outside the central area, and a price for gas supplied to public street-lamps in any urban district as aforesaid not exceeding a sum which shall be 0·8 recurring of a penny per therm less than the price per therm generally charged by the undertakers to private consumers residing within such urban district.

Herne Bay Gas and Electricity Company, Ltd.

The price now authorized in respect of the supply of gas by the undertakers is 3s. 6d. per 1000 c.ft. (with a neutral zone of 2d. to 3s. 8d.); and the price which they have asked the Board of Trade to substitute for this is 1s. 7d. per therm (with 0·4d. per therm added in lieu of the neutral zone of 2d.).

Houghton-le-Spring District Gas Company.

The maximum price now authorized in respect of the supply of gas by the undertakers is 4s. per 1000 c.ft. in the township of Houghton-le-Spring, and 4s. 6d. outside; and the price which they have asked the Board of Trade to substitute for this is 1s. 3·44d. per therm in the township, and 1s. 4·64d. outside.

SPECIAL ORDERS UNDER SECTION 10.

Hindley Urban District Council.

Application is being made by the Hindley Urban District Council to the Board of Trade for an Order to confer powers upon them with reference to the working-up, purchase, and sale of residual products; the substitution of a calorific value for an illuminating power test; the fixing of a new and permanent maximum price; the borrowing of further money; the regulation of pipes and fittings; and other purposes.

Pontypool Gas (Abersychan Gas Transfer).

Application has been made to the Board of Trade by the Pontypool Gas and Water Company for an Order authorizing the transfer to them of the undertaking of the Abersychan Gas Company, and to provide for the issue by them of shares and debenture stock of the Pontypool Company to the holders of shares and debentures in the Abersychan Company. The limits of supply of the Company will be extended accordingly; and they desire authority to raise further capital.

The Directors of the Newcastle-upon-Tyne and Gateshead Gas Company have resolved to recommend to the proprietors, subject to audit, the payment for the half year ended Dec. 31 of dividends at the rate of 4 p.ct. per annum on the preference stock, and £3 17s. 6d. p.ct. per annum upon the ordinary stock of the Company.

LANARK COUNTY COUNCIL AND GAS UNDERTAKINGS.

Purchase of the Bellshill Gas-Works.

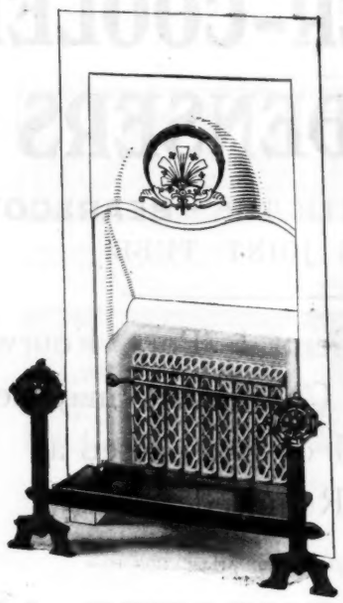
At the last monthly meeting of the District Committee of the Middle Ward of Lanark, a minute of the Gas Supply Sub-Committee was submitted, showing that the Clerk (Mr. W. E. Whyte) reported the completion of the transaction regarding the purchase and transfer, as at May 31 last, of the Bellshill Gas Company's undertaking to the County Council and District Committee, the purchase price being [as already stated in the "JOURNAL"] £52,000. The Clerk said he had, on behalf of the Committee, taken over the management; and he explained generally the working and financial arrangements in operation. The meeting approved, and agreed on his suggestion that the Committee should make an early inspection of the works, to acquaint themselves with the details of the scheme. The Clerk also reported generally on the present position of matters bearing on the acquisition of the Larkhall and Cambuslang gas undertakings, and as to certain features attending the gas supply undertakings in the Blantyre, Holytown, and Carfin areas.

Several members raised the point as to whether too much had not been paid for the Bellshill works, which, they alleged, were comparatively antiquated; but the Clerk said in 1914 the District Committee had adopted the Gas Act with a view to carrying out the policy of acquiring the existing works or laying-down new plant for gas making for the supply of the villages and the lighting of the roads, and powers had been given to the Sub-Committee to negotiate with the various companies the price and other matters. In this case, after fully considering the whole circumstances, they decided that they should settle by agreement, and avoid the expense of arbitration; and they considered they had made a good bargain in the interests of the District Committee.

After discussion, the purchase of the Bellshill works, as reported, was homologated by the District Committee, who are continuing their negotiations to acquire the gas undertakings in the Larkhall, Cambuslang, &c., areas.

Free Cookers Not Utilized.—A resolution terminating the free use of cookers has been confirmed by the Chorley Town Council. Alderman Turner (the Chairman of the Gas Committee) said the cookers had been free for eighteen years; and it was now found that 30 p.ct. were not being utilized. Some were even being used as rabbit-hutches.

Westport Gas Supply.—The recently ended railwaymen's strike against the carriage of munitions in Ireland led to a serious crisis in Westport, when the gas supply had to stand suspended owing to the impossibility of getting coal through. Newspapers using gas power had to suspend publication, as alternative machinery of any kind could not be brought in; and other industries were similarly affected. Even yet much difficulty is experienced in relation to gas manufacture.



The Main "Entente" Gas Fire.

An Appreciation.

"The three 'Entente' Fires supplied to me are most satisfactory in every way, and the burner is all you claim for it. I was rather doubtful before I had tried it whether it would be right at varying pressures, but have found it to adapt itself to all pressures and calorific powers without lighting back. I have had plenty of opportunity to test it during the past fourteen days, due to the coal strike and consequent reduction in quality of gas supplied.

"The Fire has a most pleasing effect when supplied with gas of standard pressure and quality. The fuels are fully heated to the top at a regular temperature, from bottom to top, not simply bright for the first three inches and the remainder quite dull.

"*You can certainly recommend them with every confidence to your customers.*"

R. & A. MAIN, LTD.

TRADE NOTES.

[For "Journal" Advertisers.]

"Simplex" Water-Gas Plant.

A "Simplex" water-gas plant of the Vertical Gas-Retort Syndicate, Ltd., was put into operation at the Havant Gas-Works just before Christmas last, and has since been in daily operation with satisfactory results. The plant is of the "Twin" generator type, arranged in an empty arch, having an approximate daily capacity of 150,000 c.ft. Only one generator is at present being worked.

Tully Gas Plants, Ltd.

Reference was made in last week's "JOURNAL" to the formation as a new company of Tully Gas Plants, Ltd., to acquire as a going concern and further develop the undertaking of Messrs. Bale and Hardy, Ltd., who have already erected, or are erecting, installations in over a hundred towns in Great Britain of the now well-known Tully patent carburetted hydrogen plant. Some of these have been repeat orders—the latest to come under this category having been received from Conway and Colwyn Bay. As to the new Company, the first Directors are Messrs. C. B. Tully (Chairman), P. P. Sandford, J. W. Tully, and Lieut.-Col. H. Thorpe. Dr. R. Lessing, F.C.S., is Consulting Chemist; and Mr. R. G. Shadbolt, Technical Adviser. The share capital is £150,000 in £1 shares, divided into 100,000 8 p.ct. cumulative participating preferred shares, and 50,000 ordinary shares. The purchase consideration is £43,650, payable in ordinary shares. There are now being issued 50,000 preferred shares, and 6350 ordinary shares. The registered office of the Company is at Millgate, Newark-on-Trent; and the Secretary is Mr. Percy Pratt, of No. 18, Walbrook, London, E.C.

Birmingham Gas Supply.—Owing to the substantial growth of the Acocks Green and Olton districts of Birmingham, it has been decided to provide a service of larger mains, as the present are inadequate to current requirements. The preparatory work for the installation of the new vertical retorts at Nechells, at a cost of £500,000, has been commenced.

Redcar and Coke-Oven Gas.—Gas from the Redcar Council's works, supplied to Redcar, Marske, and Saltburn, is being increased 2d. per 1000 c.ft., which will bring the price to 5s. The Council say this advance is necessary because of the higher cost of transport, the increase in wages, and the lower prices now obtained for residuals. Since the Council took over the works last October, wages have risen 20 p.ct., it is stated; while the cost of carrying fuel to the works has advanced 8s. per ton. The Council are in negotiation with Messrs. Dorman, Long, & Co., Ltd., for a supply of coke-oven gas from the firm's works at Warrenby, which is in the Redcar area. A scheme is under consideration: and an announcement on the subject is expected shortly.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Jan.* 31.

The London tar products market is rather quiet; but a sense of firmness is maintained by the fact that during this half year there will be a reduced production in the United Kingdom, owing to the closing of various works which produce tar and benzole. In the absence of recent pitch sales for export, the value is purely nominal at about 175s. net per ton. Creosote is quoted at 1s. 2d. to 1s. 2½d. net in bulk. Other products are generally unchanged.

In sulphate of ammonia, it may be said that the reduction in prices for January-May, arranged a few weeks ago, has resulted in substantial sales to farmers.

Tar Products in the Provinces.

Jan. 31.

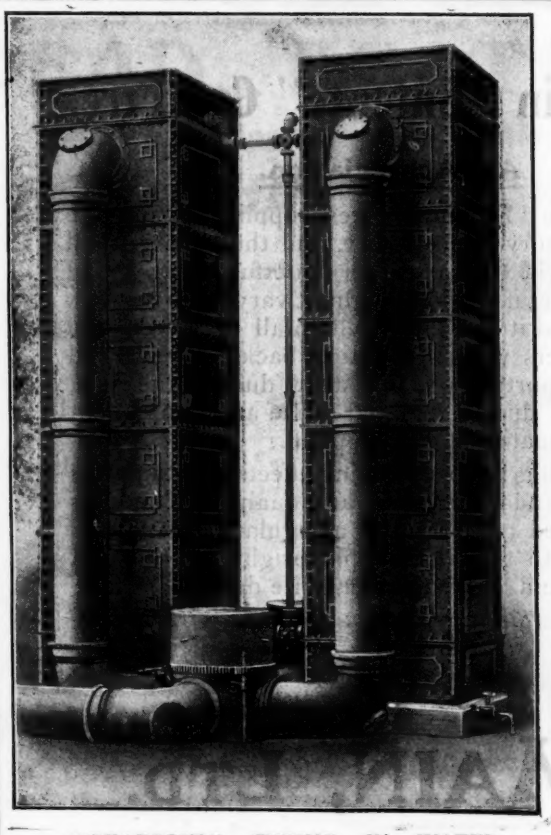
With regard to the market for tar products, there is little or no change in the value of these.

The average values for gas-works' products during the week were: Gas-works coal tar, 105s. to 115s. Pitch (all pitch prices are purely nominal) East Coast, 170s. to 175s. per ton f.a.s.; West Coast—Manchester, 170s. to 175s.; Liverpool, 170s. to 175s.; Clyde, 170s. to 175s. Benzole 90 p.ct. North, 2s. 11d. to 3s.; crude 65 p.ct. at 120° C., 2s. 3d. to 2s. 5d. naked at makers' works; 50-90 p.ct. naked, North, 2s. 11d. to 3s. 1d. Toluol, naked, North, 3s. to 3s. 1½d. nominal. Coal tar crude naphtha in bulk, North, 1s. 1½d. to 1s. 3d. Solvent naphtha, naked, North, 2s. 10d. to 3s. Heavy naphtha, North, 3s. to 3s. 2d. Creosote, in bulk, North, liquid, 1s. to 1s. 0½d.; salty, 11½d. to 1s. Heavy oils, in bulk, North, 1s. to 1s. 1d. Carbolic acid, 60 p.ct., 1s. 10d. to 2s. Naphthalene, £35; salts, £10 to £12, bags included. Anthracene, "A" quality, 1s. per minimum 40 p.ct.; "B" quality, nominal.

FROM A MARKET CORRESPONDENT.

Tar Products.

No improvement is apparent in the conditions of the bye-products market. Tar distillers are inclined to be pessimistic. A scheme by which distillers and gas companies are to work together is in operation in many parts of the country, but it is doubtful whether it is proving a commercial success. At the moment a good many products appear to be left in the tar. The demand for pitch has fallen away considerably; and very little business is passing. South Wales consumers state that their stocks are plentiful for the time being, and consequently they are not buying. One or two of the briquette works have restarted; but the fuel trade is in a state of transition, and it is very unlikely that



"BEARSCOT" TUBING IN WATER CONDENSERS EXTENDS UPWARDS OF 130 MILES.

WATER-COOLED CONDENSERS

AS FITTED WITH THE **"BEARSCOT"** SAFE JOINT TUBE.

With our Central Port Fourway Valve the Condensers may be Reversed or Bye-passed as Required.

PARTICULARS WILL BE SUPPLIED UPON APPLICATION TO—

R. & J. DEMPSTER, LD.

Telegrams: "Scrubber Manchester" **MANCHESTER.**

LONDON OFFICE:
34, VICTORIA STREET, WESTMINSTER, S.W.1.

pitch prices can be prevented from falling further. There is no sign of any revival in the rubber manufacturing industry, and, as a consequence, the demand for solvent naphtha remains very poor. Heavy naphthas are not much better. Naphthalenes are weak; and, in spite of a continued demand from the firelighter manufacturers, the price of crude material has fallen further. Refined also is lower. Carbolic acid is practically unchanged. There is now very little sale for crude, and production is likely to be curtailed, as it is very improbable that distillers would think it worth while to extract it under present conditions. Crystals are neglected without much change. Creosote oil, strange to say, is rather weaker. There is not much alteration in other directions.

The range of quotations is as follows:

Benzole: 90% London 3s. 10d., North 3s. 7d. to 3s. 9d.; 50-90% 3s. 3d. London, 3s. to 3s. 1d. North; crude 60-65%, 2s. 3d. to 2s. 5d.; pure, 3s. 3d. per gallon naked.

Crude Tar: London, 105s. to 115s.; Midlands, 107s. 6d. to 112s. 6d.; North, 105s. to 107s. 6d. per ton *ex* works. Refined tar, 85s. per barrel (free) on rail.

Pitch: London, 175s. to 180s. per ton f.o.b.; East Coast, 165s. to 175s. per ton f.o.b.; West Coast, 162s. 6d. to 170s. f.a.s., with Manchester 200s. per ton, and Glasgow 195s. per ton; South Wales, 210s. per ton.

Solvent Naphtha: 2s. 9d. per gallon.

Crude Naphtha: Naked, 11d. to 1s. 1d.; North, 1s. per gallon.

Heavy Naphtha: 3s. 2d. per gallon.

Naphthalene: Refined flake, £25 to £28 per ton nominal; inferior, £25; crude, £10 to £15 per ton, according to quality.

Toluol: Naked, 3s. 4d. per gallon nominal; North, 3s. 2d.; pure, 4s.

Creosote: London, 1s. 2d. to 1s. 3d.; North, 1s. 2d.; heavy oil, 10½d. per gallon in bulk.

Anthracene: 40-45%, 1s. 3d. to 1s. 4d. per unit per cwt.

Grease Oils: 18° Tw. (naked), £6 5s. per ton f.o.r. makers' works.

Pyridine: 18s. to 22s. 6d. per gallon.

Aniline Oil: 1s. 7d. per lb., drums extra.

Aniline Salts: 1s. 9d. per lb.

Cresylic Acid: Crude, 2s. 6d.; dark 95-97%, 3s. 3d.; pale 97-99%, 3s. 9d., per gallon, drums free.

Carbolic Acid: Crude 60%, 2s. 4d. per gallon; crystals 39-40%, 8d. per lb. nominal.

Salicylic Acid: Technical, 1s. 8d.; B.P., 2s. per lb.

Xylol: Pure, 4s. 3d.; commercial, 3s. 9d. per gallon.

Resorcin: 7s. 6d. to 8s. 6d. per lb.; pure, 21s. per lb.

Alizarine 20%: 2s. per lb.

B. Naphthol: 2s. 6d. per lb.

Sulphate of Ammonia.

Conditions are still quiet in this material, although the drop in price has caused a little activity in certain quarters. According to reports from Germany, highly developed installations for the fixation of atmospheric nitrogen are supposed to be already turning out large quantities of sulphate of ammonia. If the news upon which statements of this kind are based is true, there would appear to be a likelihood of some rather severe competition in this particular section later on in the year, owing to the favourable terms upon which the Germans could offer the product. The sulphate of ammonia market in America is featureless. News from the Pacific coast is to the effect that things are exceedingly dull. The trade there expects distinctly cheaper sulphate of ammonia; but nothing at present is being offered at lower prices from domestic sources, and there are not a great many re-sale lots in evidence.

Coal Tar and Dye Exports.—The Board of Trade (Licensing Section) announce that, as from the 1st inst., the following have been removed from Lists "A" and "B" of Prohibited Exports: Coal tar, all products obtainable therefrom and derivatives thereof, whether actually so obtained or derived from other sources (including all mixtures and preparations containing such products or derivatives), suitable for use in the manufacture of dyes or explosives. Dyes and dyestuffs manufactured from coal-tar products, and articles containing such dyes and dyestuffs.

Quality of the Shipley Gas Supply.—In a controversy which has arisen out of the opposition of the Shipley District Council to the Bradford Corporation's proposals to incorporate Shipley in Bradford, one of the chief points of argument against the Shipley Council has been allegations of poor gas. It is quite true that for many years Shipley did have poor gas, owing to unavoidable circumstances arising out of previous happenings; but at a meeting of the District Council last week, it was reported that the engineer's records, month by month, now showed the maintenance of a high level of efficiency, and a uniform quality well above that specified by Act of Parliament. Any unsatisfactory supplies, therefore, are due to defective pipes or fittings. It was stated, further, that the output of gas for the past nine months showed a record in the history of the Shipley works.

Plumbers and Gas Apparatus and Pipes.—The Lancaster Plumbers' Association requested the Corporation Gas Committee to consent to an arrangement whereby they would receive 15 p.ct. commission on the sale of gas-fires, and 25s. for fitting; but the majority of the Committee declined to endorse this. The following regulations have been made for builders and plumbers with respect to gas supply pipes: A ¾-in. gas supply-pipe from the meter to the scullery for a cooker or wash-boiler; all horizontal pipes under floors to be at least ½ in. bore; ½-in. branches to all fireplaces; tees and plugs to be left at the bottom of all upright pipes; meter cupboards or boxes to be not less than 2 ft. 6 in. high, 1 ft. 8 in. wide, and 1 ft. 6 in. deep; all pipes to have a fall to the main syphon at the meter; and pipes to be tested for leakages, for at least 15 minutes, at an air pressure of 6 in. minimum.

A TRIUMPH FOR BRITISH ENTERPRISE.

THESE UNIQUE PRODUCTS

Synchronise the requirements of the concrete age and will revolutionise building construction.

NOVOID
THE CONCRETE PROOFER
REGISTERED TRADE MARK

A powder which chemically acts upon Portland cement, and renders concrete weather, water, and oil proof by filling the voids with insoluble silicates.

"Novoided Concrete is Bone Dry under Pressure."

RENCRETE
REGISTERED TRADE MARK
The Weatherproofer

A solution similar to Everok, in a variety of practical shades, for proofing brick, plaster, stucco, etc., and rendering concrete decorative as well as weatherproof.

"The First Successful Effort in Cement Stains."

EVEROK
THE WATERPROOFER
REGISTERED TRADE MARK

A colourless solution on the Novoid principle for proofing and hardening existing cement, concrete, brick, etc. Eminently suitable for concrete floors, to prevent "dusting up," as it

"Sets Like a Rock."

QUELLE
REGISTERED TRADE MARK
THE FLAMEPROOFER

A preservative stain made in colours, to represent pitch pine, oak, walnut, etc., which renders woodwork fire, moisture, and rot-resisting, and prevents even green timber from shrinking or swelling.

"A Perfect Primer for Enamel."

BOOKLET POST FREE BY STATING THIS PAPER.

AURORA
REGISTERED TRADE MARK
DISTEMPER

The latest and most economical water paint. Supplied ready for the brush. Surfaces 640 yds. per cwt. on "Sirapite." Being "colloidal" in action, it becomes an integral part of the plaster itself.

"A Really Washable Distemper."

WRITE FOR TINT CARD AND PRICE LIST POST FREE

"THE KEENEST CRITICS HAVE BEEN CONVINCED THAT WHAT IS NOW PUT BEFORE THEM IS THE TRUTH."

THE TORBAY & DART PAINT COMPANY, Ltd., 26-28, Billiter St., LONDON, E.C.3

Wages in the Chemical Trade.—A protest has been sent by the Chemical Employers' Federation to the Chairman of the Industrial Court against the recent award of the Court, by which a general advance of wages was given to men employed in the chemical trade. The letter, which is signed by Mr. Roscoe Brunner and Mr. R. Lloyd Roberts, respectively Chairman and Secretary, states that the award is contrary to the weight of evidence submitted, and ignores entirely the present state of the industry.

Joint Industrial Council for the Mantle Industry.—The first official meeting of the Joint Industrial Council for the Gas Mantle Industry has taken place at the Ministry of Labour, No. 8, Richmond Terrace, S.W.; and the following officers have been elected: Chairman, Mr. B. Bark; Vice-Chairman, Mr. W. T. Scott. The election of a Secretary and Treasurer was deferred until the next meeting, which will take place on the 7th inst. Meanwhile, Mr. J. S. Bannatyne, c/o Mr. C. J. Healy, Nos. 11-12, Pall Mall, S.W., is acting as Secretary *pro tem.*

A Seven-Years' Gas Comedy.—Under this heading, the "Manchester Dispatch" relates the following: "How a municipal gas department unwittingly supplied a large works with gas for seven years without ever missing the big quantity used has just come to be known. In a district not far from Manchester, one part of the community is served with gas by a neighbouring council and the other by a private gas company. The supply main of each is laid along a road which divides the two areas; the pipes running side by side. In course of time, a new works was built in the private company's area. The owners applied to the company for gas; and a party of workmen joined-up the works to a main-pipe—the council's, instead of the company's. A passer-by who wished to correct their mistake met with the usual fate of the well-meaning. A meter was installed; and for seven years that faithful and inexorable instrument ticked-off the feet of gas supplied by the council, for which the proprietors of the works all the time paid the private company. A recent extension of the works, necessitating a larger gas-pipe, has revealed the mistake."

STOCK MARKET REPORT.

THE week just closed on the Stock Exchange showed a decided falling-off. Business was very quiet; and the general tone was dull and at times depressed, in almost every quarter. Gilt-edged securities were not excepted; and Home Government issues were weaker—all but Consols and Victory. Friday's figures for the big four were: Consols 48⅜—49¾, War Loan 84—84 9/16, Funding 67⅛—68⅛, Victory 75½—76¼. Bonds fell with the rest. Home Rails were persistently dull. Canadian started fairly, but gave way. Argentines were dull.

The Foreign Market was weaker on the whole, but with one or two fair lines.

The Miscellaneous Market was in poor case. Rubbers and Oils were down, though the closing prices of the latter were not the worst.

Business in the Gas Market was more active than of late; but movements in price were irregular. In the London Companies, Gas Light ordinary was put down 4, in view of the advanced charges for gas; and South Metropolitan fell 1. Commercial was unchanged. In Suburban and Provincial, Brentford debenture fell 1, Newcastle fell 1, but the debenture gained 1. All three Sheffields had further advances; but South Shields had a considerable fall. In Continental and Foreign, Imperial was quiet, and actual prices were steady; but the quotation was lowered. Primitivas were active, the preference especially so; and both issues further gained on their quotations.

Bargains done for cash during the week were as follows: On Monday, Bombay 4, 4⅛, British 21⅛, 21¾, Commercial 4 p.ct. 55, European 5½, Gas Light ordinary 53¾, 53⅞, 54, 54⅜, 56, 57, ditto debenture 46½, 47⅛, 48, Imperial Continental 124, 124¼, 124⅛, 125⅛, Portsea "B" 61, 61½, Primitiva 17s., 17s. 6d., ditto preference 33s 9d., 35s., 35s. 6d., 35s. 7½d., 36s. 3d., South Metropolitan 64, 64½, 65, 66, ditto debenture 46⅜, 47½, Colonial Gas Association 13s. On Tuesday, Bombay 3⅝, Brentford "A" 51⅛, British 21⅜, Commercial 3½ p.ct. 48⅜, European 5 15/16, Gas Light ordinary 52¼, 52½, 52⅜, 53, 53¼, 53⅜, ditto maximum 37½, ditto preference 56⅜, ditto debenture 48, Imperial Continental 123½, 125, Primitiva preference 36s. 3d., 37s. 6d., 38s. 6d., South Metropolitan 64, Tottenham "B" 51¼, 51½, Brighton and Hove 6 p.ct. preference "B" 85⅜, Colonial Gas Association 12s. 6d., 13s. On Wednesday, Gas Light ordinary 52, 52½, 53, 53¼, 53½, ditto debenture 46⅜, 48, Imperial Continental 123, 123½, 124, ditto debenture 93, 93½, Lea Bridge 77, Primitiva 16s. 3d., 17s. 6d., ditto preference 36s. 10½d., 37s. 6d., 38s., 38s. 6d., 38s. 9d., South Metropolitan 62½, 63, 63¼, 64. On Thursday, Brentford "A" 51, ditto "B" 51, Commercial 4 p.ct. 53, 53½, Gas Light ordinary 52¼, 52⅜, 52½, ditto maximum 36¼, Imperial Continental 123, 124, Newcastle debenture 50½, Primitiva 16s. 3d., 18s., ditto preference 38s. 9d., South Metropolitan 62½, Woking 7½ p.ct. debenture 100. On Friday, Brentford debenture 57, Commercial 3½ p.ct. 49, ditto debenture 43⅜, Gas Light ordinary 53, 53⅛, 53¼, 53½, Imperial Continental 123½, 124, 124¼, 124½, ditto debenture 92⅜, Primitiva 15s., 17s. 6d., ditto preference 37s. 6d., 37s. 9d., 38s. 6d., 38s. 9d., 39s., South Suburban 57, Wandsworth debenture 42, Hampton Court 5 p.ct. consolidated 50, 50½, Hornsey 5 p.ct. preference 59½, 60.

In the Money Market, there was a fair demand early in the week, which gradually stiffened until, on Thursday, the situation became decidedly tight; but adequate supplies came in later to the general relief. Silver had a sharp fall, and closed at 36⅜d. The Bank rate is 7 p.ct., fixed on April 17 last.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
182,049	Stk.	Aug. 27	4	4%	Aldershot 4 p.c. Pref.	...	56—61	...
1,551,868	,,	Oct. 14	2½	3 1/18%	Alliance & Dublin Ord.	59—64	38—43	...
374,000	,,	Jan. 13	4	4%	Do. 4 p.c. Deb.	76—79	47—52	...
280,000	5	Oct. 28	7½	8%	Bombay, Ltd.	5¼—6¼	4—4½	3¾—4¼
100,000	5	Aug. 12	16	5%	Bournemouth Gas and Water: B 5 p.c.	...	8—9	...
383,110	10	,,	7	7%	Bournemouth Gas and Water: B 7 p.c.	15—15½	8¼—9¼	...
115,000	10	,,	6	6/-	Bournemouth Gas and Water: Pref. 6 p.c.	13¼—14	7¼—8¼	...
162,065	—	Dec. 30	—	4%	Bournemouth Gas and Water: 4 p.c. Deb.	...	55—60	...
992,045	Stk.	July 14	14	30/-	Brentford A Consolid.	261—266	50—55	51—51½
734,920	,,	,,	11	26/3	Do. B New	204—209	47—52	51
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	68—73	...
221,400	,,	Dec. 15	4	4%	Do. 4 p.c. Deb.	91—93	57—59	57
214,775	,,	Aug. 27	11	7½%	Brighton & Hove Orig.	208—213	100—110	...
244,200	,,	,,	8	5½%	Do. A Ord. Stk.	154—159	75—85	...
1,287,500	Stk.	July 29	5	5%	Bristol 5 p.c. max.	...	...	...
530,000	20	Sept. 15	12½	10%	British	44—45	20—22	21¼—21⅝
120,000	Stk.	Dec. 30	4	4%	Do. 4 p.c. Deb. Stk.	88—90	55—57	...
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	37—40	...
100,000	10	May 27	—	—	Cape Town & Dis., Ltd.	1¾—2¼	7—7½	...
100,000	10	Dec. 10	—	4½%	Do. 4½ p.c. Pref.	4—6	5—6	...
100,000	Stk.	Dec. 30	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	54—59	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	...	...
1,513,280	,,	Aug. 12	5/9/4	30/-	Commercial 4 p.c. Stk.	106—108	53—56	53—55
560,000	,,	,,	5½	26/3	Do. 3½ p.c. do.	103—105	47—52	48½—49
475,000	,,	Dec. 15	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	42—45	43½
800,000	,,	Dec. 11	4	—	Continental Union Ltd.	76—79	25—30	...
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	40—50	...
51,600	,,	Aug. 27	14½	10½%	Croydon A 10 p.c.	...	125—135	...
278,400	—	,,	11½	7½%	Croydon B and C 7 p.c.	..	90—100	...
492,270	Stk.	—	6	5%	Derby Con. Stk.	123—125	...	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	...	...
1,002,180	10	Jan. 29	10	5/0	European, Ltd.	17½—18	5½—6½	5½—5 15/16
16,298,975	Stk.	July 29	4/17/4	30/-	Gas Light and Coke: 4 p.c. Ord.	98—102	52—55	52—57
2,600,000	,,	,,	3½	26/3	Gas Light and Coke: 3½ p.c. max.	76—79	36—39	36¼—37½
4,062,235	,,	,,	4	4%	Gas Light and Coke: 4 p.c. Con. Pref.	96—99	55—58	56¾
4,674,850	,,	Dec. 15	3	3%	Gas Light and Coke: 3 p.c. Con. Deb.	72½—74½	45—48	46¼—48
130,000	,,	Dec. 11	10	10%	Gas Light and Coke: 10 p.c. Bonds.	...	...	...
82,500	,,	Sept. 15	5	3½%	Hastings & St. L. 5 p.c.	...	53—58	...
258,740	,,	,,	3½	2½%	Do. 3½ p.c.	87—89	37—39	...
70,000	10	May 13	11	8%	Hongkong & China, Ltd.	16½—16¾	8¼—9¼	...
86,600	Stk.	Sept. 15	9	5½%	Hornsey 7 p.c.	...	87—89	...
131,000	,,	Aug. 12	7½	4½%	Ilford A and C	151—154	79—84	...
65,780	,,	,,	6½	3½%	Do. B	115—118	57—62	...
65,500	,,	Dec. 30	4	4%	Do. 4 p.c. Deb.	92—94	54—56	...
4,940,000	,,	,,	9	4½%	Imperial Continental	150—160	122—127	123—125½
1,235,000	,,	Aug. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	90—95	92½—93½
235,242	,,	Sept. 15	6½	5%	Lea Bridge Ord. 5 p.c.	119—121	80—85	77
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord. A.	211—213	...	...
					Liverpool 5 p.c. Ord. B.	146—148		
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	...	...	...
165,736	,,	Aug. 12	7/5/6	3½%	Maidstone 5 p.c.	...	52—57	...
75,000	5	June 11	6	3%	Malta & Mediterranean	4¼—4½	1½—2½	...
250,000	100	Oct. 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	86—93	...
541,920	Stk.	Nov. 26	4	6%	Monte Video, Ltd.	11½—12	68—73	...
1,875,892	,,	July 29	4½	3 1/16%†	Newcastle & Gatsh'dCon.	98¼—99½	59—61	...
529,705	,,	Dec. 30	3½	3½%	Do. 3½ p.c. Deb.	82—83	50—51	50½
15,000	10	Sept. 15	—	8%	North Middlesex 10 p.c.	...	12½—13½	..
55,940	10	,,	7/14/0	58%	,, ,, 7 p.c.	14—15	7—7½	...
300,000	Stk.	Nov. 26	8	8%	Oriental, Ltd.	117—122	93—98	...
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	2½—2¾	2—3	...
60,000	50	Aug. 27	13	7½%	Portsea Island, B	128—131	65—70	61—61½
100,000	50	,,	12	6½%	Do. C	118—121	50—55	...
249,980	5	April 29	8	—	Primitiva Ord.	5½—6	½—1	15/—18/-
499,960	5	June 26	5	—	Do. 5 p.c. Pref.	4½—5	1½—2	33/9—39/-
521,600	100	Dec. 1	4	4%	Do. 4 p.c. Deb.	91—93	67—69	...
600,000	Stk.	Jan. 27	4	4%	Do. ,, ,, 1911	...	39—41*	...
346,198	,,	Dec. 30	4	4%	River Plate 4 p.c. Deb.	85—87	35—39	...
150,000	10	Sept. 30	6	6/-	San Paulo 6 p.c. Pref.	10½—11	6½—7½	...
125,000	50	Jan. 3	5	5%	San Paulo 5 p.c. Deb.	47—49	37—39	...
135,000	Stk.	Aug. 27	10	5%	Sheffield A	223—224	63—66	...
209,984	,,	,,	10	4%	Do. B	222—224	63—66	...
523,500	,,	,,	10	3½%	Do. C	220—222	60—62	...
133,201	Stk.	Sept. 15	4	4%	Shrewsbury 5 p.c.	...	...	...
90,000	10	Sept. 30	9	9%	South African	10½—11½	10½—11½	...
6,609,895	Stk.	Aug. 12	5/4/0	5%†	South Met. Ord.	111—113	62—65	62½—66
250,000	,,	Jan. 13	—	5%	Do. Red. Pref.	...	90—92	...
1,895,445	,,	,,	3	3%	Do. 3 p.c. Deb.	72½—74½	45—48	46½—47½
224,820	,,	Aug. 27	8½	3%	South Shields Con. Stk.	157—159	89—91	...
1,087,795	,,	July 29	6	3½%	S'th Suburb'n Ord. 5 p.c.	114—116	56—61	57
247,358	,,	Dec. 30	5	5%	Do. 5 p.c. Deb. Stk.	116—118	65—70	...
647,740	,,	Nov. 12	7½	3½%	Southampton Ord.	99—102	55—58	...
121,275	,,	Dec. 30	4	4%	Do. 4 p.c. Deb. Stk.	...	57—59	...
120,000	,,	Aug. 12	—	3½%	Tottenham A 5 p.c.	135—138	60—65	...
782,275	,,	,,	6	2½%	Tottenham District B 3½ p.c.	115—117	50—55	51½—51½
181,255	,,	Dec. 15	4	4%	Tottenham District 4 p.c. Deb.	87—89	55—58	...
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	...
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	...
236,476	Stk.	Sept. 15	5	3½%	Tynemouth 5 p.c. max.	108½—109	69—71	...
30,000	,,	Aug. 27	8½	47/6	Wandsworth, Wimbledon, and Epsom—Wandsworth A 5 p.c.	151—156	75—80	...
253,636	,,	,,	6½	32/6	Do. B 3½ p.c.	129—134	53—58	...
108,075	,,	,,	—	33/3	Do. C	...	50—55	...
140,865	,,	,,	—	33/3	New Ordinary	...	50—55	...
352,000	,,	,,	6½	26/3	Wimbledon 5 p.c.	117—122	43—48	...
98,000	,,	,,	6½	32/6	Epsom 5 p.c.	121—126	50—55	...
88,416	,,	Dec. 30	3	3%	5 p.c. Deb. Stk.	66—69	43—45	42

* Ex Div. † Next dividend will be at this rate.

Cannock Gas Company.—The annual report of the Cannock, Hednesford, and District Gas Company shows a very successful year's trading in 1920, and the Directors recommend a dividend of 5¼ p.ct., as against 4¾ p.ct. in 1919.

Importation of Dyestuffs.—The Board of Trade again desire to draw attention to the fact that applications for licences for the importation of synthetic organic dyestuffs, colours, and colouring matters, and organic intermediate products used in their manufacture should be made to the Secretary, Dyestuffs Advisory Licensing Committee, Board of Trade, Danlee Buildings, Spring Gardens, Manchester.

Holytown Gas Developments.—Extensive developments are being made at the works of the Holytown Gas Light Company, Ltd. Contractors are being employed to supply and erect complete gasification plant capable of producing 75,000 c.ft. per day. Pipe-lines have also to be laid; and an early start is to be made with the work. The Manager (Mr. James M'Nair) has all plans and specifications prepared. There is an increasing demand for gas in Holytown and the vicinity.

Birmingham and the Residuals Slump.—When the last revision of the price of gas was made in Birmingham, Alderman Lloyd stated that the Committee had estimated for an increased revenue from residuals. This calculation has, of course, now been upset; and unless a remarkable change comes over the bye-products market, there will, instead of the expected increase, be a heavy decrease to meet. So far, however, the Committee have not had under consideration the question of a further increase in the price of gas.

Radcliffe Joint Gas Board Proposal.—Whitefield electors last Saturday voted on the question whether the district should be associated with Radcliffe and Little Lever in the promotion of a Bill in Parliament for the transfer of the undertaking of the Radcliffe Gas Committee to a Joint Board. Previously the ratepayers had rejected the scheme at a public meeting. There are 2800 electors on the list, but only 618 recorded their vote. The result was as follows: For the scheme, 211; against, 407; majority against, 196. Whitefield thus joins Prestwich in negation of the proposals, leaving Radcliffe and Little Lever as the promoters of the Bill.

Petrol Substitutes.—The second report on motor fuel, prepared by a Sub-Committee appointed by the Standing Committee on the Investigation of Prices, which was issued on Monday, referring to substitutes for petrol, says that, in view of the recent abandonment of the gas standard, the Sub-Committee are strongly of opinion that there should be a statutory obligation on all gas companies above a certain size, completely to extract the benzole from their gas. Existing shale oilfields should be encouraged by the Government. As to gas, there are now types of portable gas-producers for vehicles, which have already passed beyond the experimental stage. Their use should be extended—more particularly for transport lorries, agricultural machinery, and omnibuses. This form of power would appear immediately available, and opens up a most hopeful avenue of relief.

Cheltenham Chamber of Commerce and Gas Prices.—At a meeting of the Cheltenham Chamber of Commerce, the Chairman (Mr. W. Welstead), referring to the discussion on the price of gas at a previous meeting, said he understood the Gas Company felt that they had been rather unfairly and unjustly treated by their fellow members of the Chamber of Commerce. He was sure no one wished to treat the Company unfairly; but when the Company claimed to be treated differently from other people, because they were members of the Chamber, he would like to point out to them that they stood in a different position from the ordinary trader. If the public were dissatisfied with an ordinary trader, they left him and went elsewhere; but in the case of the Gas Company, who held a monopoly, they could either take the commodity from the Company or go without. Mr. Chandler said his experience was that the quality of the gas was better now than a few months ago. Mr. Whitbread said his information was that for cooking and heating purposes the gas was only equal to half its former quality. He also compared the present price of 5s. 6d. per 1000 c.ft. with the 4s. 10d. charged at Gloucester, and very little more than half 5s. 6d. in Evesham. Mr. Midwinter thought it only fair to point out that the chief object the Company appeared to have in asking for new powers was to get rid of the restriction under which they could only pay 3¾ p.ct., so that they might revert to a 5 p.ct. dividend, which was none too much for an industrial undertaking. The matter then dropped.

The Chorley Gas Committee have decided to make application to the Ministry of Health for sanction to borrow £5000 for an extension of the gas-mains.

At Bradford, during last week-end, two aged people, Matthew Robertson and his wife, died as the result of accidental gas poisoning, due to leakage from a defective gas-tap.

An auxiliary machine catching fire at the Bradford Electricity Works, on Thursday last, necessitated all the direct current supply being cut off from the city for about three-quarters of an hour.

The Board of the Glenboig Union Fire Clay Company, Ltd., have unanimously appointed Mr. James Dunnachie to succeed his father, whose death has lately occurred, as Chairman and Managing Director.

The Highways Committee of the London County Council have agreed to pay the Gas Light and Coke Company increased charges in respect of the lighting and extinguishing of the gas-lamps on the Thames bridges and embankments.

A verdict of "Suicide while of unsound mind" was returned at an inquest last week on Henry Barnes, of Smethwick, who was discovered under the bedclothes, with a gas-pipe torn from the wall, and the tube placed beneath the clothes.

Mr. J. H. Barrett, of Bangor (co. Down), who for a number of years has represented in Ireland the Manchester Paint and Varnish Company, Ltd., has now been appointed to represent the Company in London and the surrounding district. Mr. Barrett's departure from Ireland will be much regretted by a wide circle of friends in the gas industry there.

The London and Southern District Junior Gas Association are visiting on Friday afternoon of this week, at 2.30, the Lots Road Power House of the London Electric Railway Company. Friday evening, the 18th inst., is to be a discussion meeting, contributions to which have been promised by Mr. F. A. Frost, Mr. D. C. Cross, Assoc.M.Inst.C.E., and Mr. W. Grogono.

A suggestion worthy of some consideration has been made in the local press at Bradford, that some system of co-ordination must be established between the City Surveyor's Department and the Gas and Electricity Departments, under which, before plans were passed for the erection of any new factory chimneys, efforts should be made to induce the mill-owner to adopt gas or electric power, and so reduce the smoke menace.

Mr. Arthur Mead has severed his connection with the Richmond Gas Stove and Meter Company, Ltd., of Warrington, having resigned his position of Manager to their Furnace Department, and is shortly joining Stockport Furnaces, Ltd., of Stockport. Mr. Mead, prior to taking up his last position, was for ten years Superintendent of the Fittings Department of the Sheffield Gas Company, where he had considerable experience with the sale of furnaces, &c.

The Hammersmith Borough Council report the receipt of an intimation from the Gas Light and Coke Company that, as from April 1 next, the Company's charges for lighting and maintenance of public lamps will be increased to an all-round figure of £3 2s. 6d. per lamp per annum, owing to the rise in the cost of labour and materials. The Company add that, should their costs be reduced in the future, they will be glad to give the Council the benefit of the reduction.

Messrs. A. & W. Richards, of No. 37, Walbrook, E.C., acting upon the instructions of the Directors, are issuing £30,000 of 7½ p.ct. debenture stock, to be redeemed at par on June 30, 1931, in the Lea Bridge District Gas Company, supplying Walthamstow and part of Leyton. The issue price is par; and the money is required for the purpose of making extensions to the works and plant which are rendered necessary by the increasing demand for gas. Applications for the stock should be made by Monday morning next.

The Directors of the Tottenham District Light, Heat, and Power Company recommend, subject to the approval of the Board of Trade, the payment of the final statutory dividend for the half year to Dec. 31—namely, at the rate of 5 p.ct. per annum on the preference stock, £3 15s. p.ct. per annum on the "A" stock, and £2 12s. 6d. p.ct. per annum on the "B" stock, all less income-tax. The undivided balance, including a sum of £7151 brought forward from the last account, is £13,174. The dividends will be payable on and after the 19th inst.

The newly-formed Burt, Boulton, and Haywood, Ltd., Athletic Club had a very successful dinner (organized by the City Office Section) at Anderton's Hotel, Fleet Street, E.C., on the 18th ult. Mr. D. Harold Boulton, who was the moving spirit in the formation of the Club, was in the chair, and the Directors of the Company were guests of the Club. There were present 115 members from the City office, Silvertown, and Rotherhithe works. After the Loyal Toast, the Chairman proposed "The Club," which was responded to by Captain G. E. Yonge (Secretary of the Company and Treasurer of the Club) and Mr. F. G. Waddy (Secretary of the Club). The toast of "Our Guests" was proposed by Major A. G. Saunders, and responded to by Sir Harold Boulton, Bart., C.B.E., C.V.O. (Chairman of the Company). Mr. H. Stringfield proposed "The Chairman."

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THE Cleator Moor Urban District Council require a MANAGER for their Gas-Works. Annual make, 30,000,000 c. ft.
The Person appointed must have Good Practical Experience of Sulphate of Ammonia Plant and will be required to devote the whole of his time to the service of the Council.
Applications, stating Age and Experience, and enclosing Two Testimonials, to be sent to the undersigned on or before Feb. 9, 1921. Salary, £300.
HENRY ROTHERY,
Clerk to the Council.
Public Offices,
Cleator Moor,
Jan. 26, 1921.

WANTED—Gas Engineer and Manager for Works near Sheffield. Make, 26 Millions.
Applications, by letter, giving full Particulars of Experience, Age, and Salary required, accompanied by *copies* of Three recent Testimonials, before Feb. 12 next, to No. 7011, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

WANTED—Second Assistant. Must have good knowledge of Chemistry and able to carry out all Works Tests.
Applications, stating Age, Experience, and Salary expected, together with Testimonials, to be sent to Mr. J. W. AUCHTERLONIE, Engineer and Manager, CAMBRIDGE UNIVERSITY AND TOWN GAS LIGHT COMPANY.

SMART Young Representative required by a Firm of Good Repute. Essentials: Energy and Enthusiasm, accustomed to Calling upon Gas Engineers, and Possessing General Technical Knowledge. Good Salary and Commission for capable man.
Apply, by letter, stating Age and Salary required, to No. 7013, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

MAINLAYER Wanted. Good all-round Experience in Tracing Defects and in Laying Mains of 12 in. diameter and upwards Essential.
Apply, stating Age, Experience, and Wages required, to H. BURTON, Engineer and Manager, GAS-WORKS, SHIPLEY.

WANTED—Good Main and Service LAYER.
Apply, stating Age, Experience, and Wages required, to VINCENT HUGHES, Engineer, SMETHWICK GAS-WORKS.

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